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## THE POSSIBILITIES IN THE QUANTITATIVE CORRELATION BETWEEN AIR AND BONE-TRANSMITTED SPEECH.

DR. A. G. POHLMAN, St. Louis.

The average human being would probably live quite happily even if he never heard a sound above the uppermost tone of the piano and was relatively deafer than normal for the two lower octaves. Perception deafness does not materially affect the individual until the disability of the high frequency range falls to the upper limits of the piano and even then it is a high pitch tinnitus or some other symptom which brings him to the otologist for examination. The unusual cases of internal ear deafness, which affects the low frequency end of the audible range more than for the higher frequencies, show a similar disability in an unintelligibility for spoken language. Conduction deaf cases on the contrary hear just as normal individuals do, provided sufficient intensity is developed to compensate for the lowered acuity. For this reason cases with complete conduction deafness but with relatively normal perceptive apparatus hear telephone conversation well because the telephone output lies beyond the maximum possible disability due to the functional loss

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of the sound transmission apparatus, which is about 40 db. When perception deafness advances to the point where a deformation of the speech frequency range occurs, the patient reports a loss in intelligibility because "folks do not speak as distinctly as they formerly did," or "people nowadays mouth their words." The conduction deaf person, on the contrary, indicates he understands one individual fairly well but is confused where many people are speaking. Such cases must, of course, be clearly separated from the perception deaf type where an even depression of the entire frequency range sensitivity is noted—a result which has been experimentally duplicated in normal cases where the hearing acuity is lowered by systemic toxins, such as in quinin.

It is also well known, perhaps subconsciously, rather than consciously, that the auricle acts as a reinforcing agent for sounds of the high frequency end of the audible range. This may be demonstrated by making an audiometric test at 4096 Hertz and determining the threshold with the receiver applied tightly to the ear. It will be found that the signal becomes obviously louder when the receiver is removed from contact with the auricle. It is also demonstrated by the increased efficiency shown in perception deafened cases when the hand is cupped back of the ear, or where one of the aids to hearing based on this principle is employed. It may be remarked parenthetically that this particular aid to hearing shows certain details in construction which quite disregard what is known in acoustics, but this again is not peculiar to this particular apparatus. Sabine<sup>1</sup>, who investigated the aids to hearing, comments on this point and also calls attention to the fact that some of the aids appeared to be detrimental, rather than helpful. The case tested by him showed the greatest benefit through cupping the hand back of the ear. The acoustic fan was quite negative. The reason why the hand-back-of-the-ear was so successful was dependent on the deformation in the reception of the speech range due to greater loss at the high frequency and the hand increased the size of the auricle and therefore acted selectively to intensify the higher frequencies more than the lower pitch range.

The acoustic fan operates on an entirely different principle. Here a relatively large diaphragm is presented to the air vibrations and the vibrations of the diaphragm are transmitted to the teeth and thence to the ear by bone conduction. The fan is not useful in normal individuals and in Rinne positive cases because the efficiency of the functional air sound transmission apparatus is relatively great and the contributions to the intensity developed in the internal ear by the fan do not come to consciousness.

However, in the Rinné negative type with stapes fixation, the fan may be of great benefit because in such cases the air sound transmission apparatus is functionally out of commission. This was quantitatively demonstrated in a case reported by Kranz and the writer<sup>2</sup>. The fan has two desirable objections: it advertises the disability; and it makes it impossible for the individual to talk and to listen at the same time. As opposed to this, as an advantage, it develops no intrinsic sounds. It is well known, although not over-emphasized in advertisements, that the efforts toward a concealment of the disability tend to defeat the very purpose for which the apparatus is designed because all aids to hearing are directional in their response, and also because one unconsciously raises the intensity of the voice when speaking to a person who wears an aid to hearing. This phenomenon is similar to what takes place in conduction deaf cases where the voice intensity is controlled through bone transmission with the result that they speak in a low voice and normal hearing persons tend to whisper back. The acoustic fan is a valuable diagnostic aid in determining the efficiency of the perceptive apparatus for the speech range.

It is well known that many conduction deaf cases seem to prefer to listen to the bone conduction developed by the air receiver on the mastoid. This has led to the popular misconception that an individual who is quite deaf for air sounds would hear a bone-transmitting telephone much better. Personally, I have never seen a case where the cochlea could be reached by bone transmission where the responses to the air receiver were wanting. In point of fact, the air transmission may always be demonstrated if anything can be heard at all, even where bone transmission is negative. The bone telephone, therefore, has no pedagogic value except as a tactile source and in this case should be employed on the fingers, rather than on the head.

Accordingly speech may be transmitted to the cochlea either by way of the air sounds or by that of bone sounds, but not by both. This is true except where the voice production lies within the individual himself. The individual does not hear his own voice as others hear it because others merely employ the one route for transmission, while in the individual himself both routes are undoubtedly effective. This is not due to the difference in the efficiency of the two routes but rather to the intensity differences at various frequency levels between the air sound developed and the vibrations which take place in the solid media of the head. The vibrational responses of the head structures are more pronounced at the lower frequencies, while for air sounds the relative intensity is better developed for high frequencies. The result is that the low end of the range passes to

the cochlea by direct transmission, while the higher end comes through the external ear and sound transmission system. Up to about 1048 Hertz one hears one's own voice by bone conduction, while above 1024 Hertz by air conduction. This explains the change in quality in the voice production in both the perception and the conduction-deafened cases, or even that normally experienced when the external canals are occluded. Here the low frequency end of the speech range is enhanced for bone transmission, while the high end is depressed for air transmission.

The range of frequencies involved in the reception of speech has been carefully investigated by the Bell Telephone Laboratory Company experts and takes in from 512 to 2048 Hertz. This range is employed in the Western Electric audiometer charts for calculating the conversational loss. The figure is arrived at by multiplying the average loss in db. for these frequencies by the factor 0.8 on the basis that a complete loss of serviceable hearing is represented by the intensity level of 125 db. It must, however, be remembered that according to this method a 25 per cent loss means an intensity increase by 1,000, while a 50 per cent loss equals an intensity increase of about 1,000,000. The calculation is convenient, even if arbitrary, but has the disadvantage of not including the deformation factor. For example, the case with conduction deafness and with relatively even losses in acuity at all three octave frequencies included is in a different situation than one where the entire loss is concentrated at the high frequency end, as in a perception deafness. This is true in spite of the similar loss as calculated. It is for this reason that tests on the loss for the conversational range may best be made by employing the conversational test itself.

The spoken-whispered voice test, while useful perhaps in ordinary practice, has a number of serious disadvantages which apparently are not fully appreciated. There is variability of voice intensity and in voice production; in the intelligibility of the various speakers; and in the character of the room in which the test is conducted. The subjective responses are also dependent on the intelligence of the subject; the intelligibility of the material spoken; and the attention factor. In addition, the inverse square law governing the intensity does not hold and is directly affected by a number of factors. Because one can hear a whisper across the dome in St. Paul's, of London, does not mean one hears more acutely. Indeed, the patient tested in a large reception room will show improvement on being retested in an office cubicle or may give evidences of obviously lowered acuity when the test conditions are reversed, and neither is a real phenomenon. Similarly, the inability of the foreigner to under-



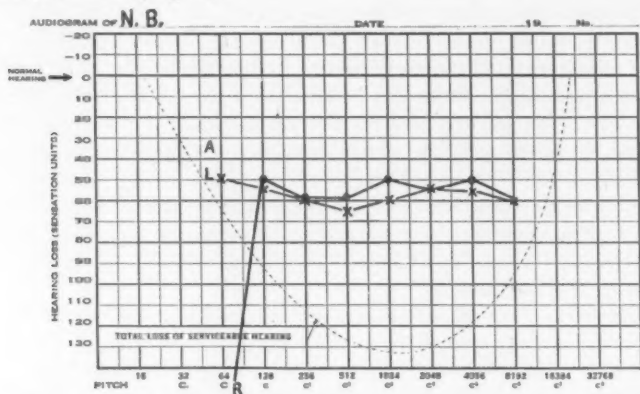
stand either the English or his own language when spoken by the examiner is by no means a criterion of his acuity of hearing. My German colleagues, for example, note the compromise between the "v" and the "w" on my part, although I am not conscious of this myself. This factor I ascribe to my own defective hearing (presbycusis), rather than to lack of interest or intelligence.

It is, however, possible to exhibit the spoken voice in such a manner that the quality is standard and the intensity under a quantitative control. A method was demonstrated at the St. Louis meeting of the American Laryngological, Rhinological and Otological Society<sup>3</sup> where the speech was delivered by a phonograph and where the intensity was controlled to a telephone receiver either by shifting the secondary of an inductorium away from the primary or by means of a resistance box across the secondary circuit. The intensity delivered could, therefore, be determined by the distance of the displacement of the secondary of the inductorium or by the number of ohms resistance in the shunt. About this time the Western Electric 4a audiometer was developed and here the method employed is even better because the intensity of the signals is engraved directly on the phonograph record. The 4a audiometer is being successfully employed in the testing of school children and is too well known to require comment. The apparatus, however, has a disadvantage which is similar to that in the spoken-whispered voice test, in that the method is restricted to air sounds.

The writer has shown elsewhere that the air sound transmission apparatus may be regarded as equally efficient throughout the audible range<sup>4, 5</sup>. The experiments also developed that this same rule obtained for bone transmission even though bone transmission normally does not follow the air sound transmission apparatus. It was accordingly thought possible to correlate the acuity for hearing both air and bone transmission quantitatively in spite of the obvious differences in the routes followed by the two types of vibrations.

The first possibility has already been pointed out<sup>6</sup> and consists in employing a bone receiver both as a bone telephone and also as a loud speaker by applying it to a properly resonant surface. This method has the disadvantage of including the acoustic qualities of the test room, insofar as air sounds are concerned. The second method was devised at the audiometric laboratory of Dr. J. F. Fairbairn, of Buffalo. This consists in so damping and desensitizing an air telephone that the peak response coincides with that of the bone telephone when placed under the same conditions of amplification and attenuation. If the two transmission routes are about equally efficient and the two telephones are also of equal efficiency

throughout the range, then in one and the same individual the acuity curves should coincide within a reasonable error. The tests were made in a silence room and a sliding frequency method was employed. This consists in plotting the curve obtained by determining the edges of the range heard at given intensity levels and has the advantage of eliminating all noises due to opening and closing of switches. The levels chosen are indicated at the left of the chart and the frequency range is shown on the base line in terms of condenser dial readings with the "c" frequency values noted. The bone acuity curve was taken from the forehead (broken line) and the air acuity indicated as a solid line on the right and -x- line on the left were obtained by the damped receiver provided with soft rubber contact (Fig. 1).



The bone acuity curve mounts rapidly to a peak at 32-35 and then falls quite abruptly to 45, where a recovery takes place in the form of twin peaks at 47 and at 53, followed by a second rapid fall to 56. Between 45 and 50 a curious and constant phenomenon is observed in the form of a bell-ringing which is synchronous with the pulse and which has been present for a number of years. Above 50 the tone again becomes pure and is definitely lateralized to the right. This same phenomenon is observed when the ears are occluded.

The air acuity curves for the right and the left practically coincide up to 40 (2048 Hertz) when that of the left rapidly drops to the base line (maximum output) at 43 and with suspicion of a recovery at 46. The sensitivity of the right ear drops somewhat less rapidly at 45 with a peak of recovery at 50 and then falls to the base line practically at 4096 Hertz. The air acuity curve of the right corresponds closely to the bone acuity from the forehead and explains

why the lateralization of the bone sounds above 50 was to this side. The bell-ringing effect, however, is not identified by air transmission. This suggests that the cause lies neither in the middle ear nor in the internal ear itself and may possibly be located in the close relation of the carotid canal to the pitch area involved. Perhaps a similar factor is responsible for the areas of lowered sensitivity found not uncommonly about an octave above this frequency. The evidence submitted appears to confirm the view that both transmission routes are about equally efficient, although the absolute differences in the intensity cannot be determined by this method.

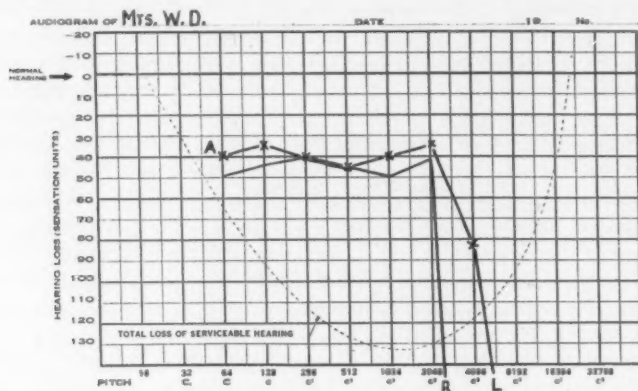
So far then, the analysis of simple tones seems to show that the air sensitivity curve for the right ear practically coincides with that for bone transmission from the forehead, while the left ear shows a more pronounced presbycusis than the right. It follows that complex sounds would probably show a similar effect, and this was checked by means of a phonograph with a standard talking record replacing the oscillator as a source. The intensity was attenuated to the point that nothing could be heard and the intensity gradually increased to the level of intelligibility. It was found by this method that the intensity level required for the right ear and for the bone telephone was practically identical, while for the left ear a slightly increased intensity was required. The information on the importance of the range from 512 to 2048 Hertz for speech intelligibility by telephone as determined by the Bell Telephone Laboratory is essentially correct because the hearing acuity is normal for both ears throughout this range. This was again checked by adjusting the delivery of the Western Electric spoken record so that the normal range of numbers was heard by bone transmission. Here again the air acuity for the right ear proved to be normal, while that for the left ear was only very slightly lower than normal. In spite of the fact that the writer knows the internal ear disability on the left is considerably greater than on the right and in spite of a constant high pitch tinnitus on the left, which has remained since his experiments with quinin, he is not conscious of a hearing disability on either side so far as spoken language is concerned.

The writer is aware that his own bone acuity lies well above the average normal throughout the range heard, up to 50, disregarding the lowered acuity areas. Accordingly, the average normal who hears 11 numbers of the Western Electric record by air will hear fewer numbers by bone transmission. It is also evident if the conditions are so adjusted that the normal acuity by air is for 11 numbers, then the maximum output of the record is a factor of about 30 db. If this is true, then a Rinne negative case with stapes

ankylosis will not hear the air telephone at all and the condition of the perceptive apparatus will be indicated by the numbers reported by bone transmission.

Case 1 is a typical Rinne negative individual with complete conduction deafness, as shown in the even depression of the acuity curve from 64 to 2048 (Fig. 2). Above this frequency the patient clearly indicates a perception deafness. The patient reports eight to nine numbers by bone transmission, while no numbers were heard with either ear by air transmission with the matched receiver.

Case 2 is a Rinne negative type with evidences of a complete conduction deafness which affects the entire frequency range (Fig. 3). However, it will be noted that if a 35 to 40 db. disability represents a complete functional loss of the air sound transmission

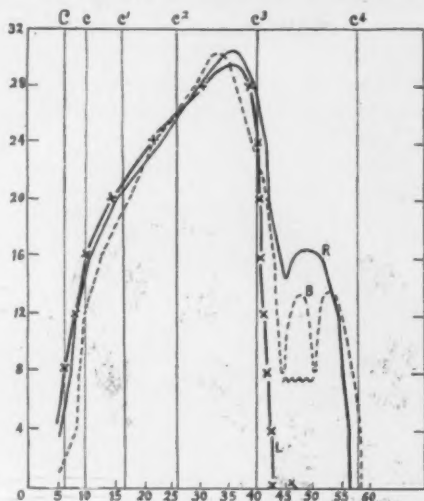


apparatus, then the further increase in disability by 15 to 20 db. must be due to a depression in the sensitivity of the sound perception apparatus. This depression should be manifested in the bone sensitivity, which is true because only six to seven numbers were heard, while nothing was heard by air transmission.

The results of these direct correlations indicate that there is no evidence of a mechanical selectivity in reference to the frequencies transmitted for either air or bone sounds. In other words, the air sound transmission apparatus, as opposed to the accepted interpretation, is of about equal functional efficiency throughout the pitch range. This same statement appears to be true for bone transmission. It is obvious that this method may be applied to a direct quantitative correlation between the acuity for hearing air and bone-transmitted speech, provided the two types of receivers are definitely

matched or definitely evaluated on the basis of quantitative responses.

These possibilities are being considered at the present time, employing the Western Electric 4a audiometer with the electro-magnetic pick-up as the source. The output of the apparatus has been modified through the courtesy of the Bell Telephone Laboratories by Dr. Harvey Fletcher so that the maximum output available from the spoken record (75 db.) is available for bone transmission.



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1402 South Grand Boulevard.

## HISTOLOGICAL ANATOMY OF THE INTERNAL EAR, WITH SPECIAL REFERENCE TO THE COCHLEA.\*

DR. MARVIN F. JONES, New York.

The local committee of the American Otological Society delegated to me the task of collecting anatomical material to be used in the study of otosclerosis.

Our efforts during the past year have been concentrated on the preparation and examination of infant temporal bones. The sections I wish to show you this evening were prepared by Dr. Hemsath at the Lying-In Hospital. Our earliest specimens were transported to

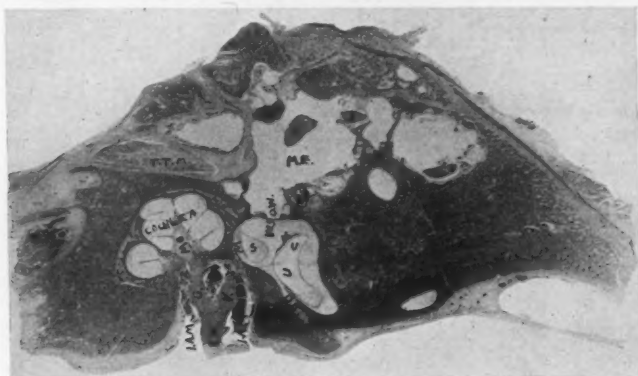


Fig. 1. Human temporal bone, horizontal section. Cochlear nerve shown through its entire course in the temporal bone.

T.T.M.—Tensor tympani muscle. MA—Malleus. I—Incus. M.E.—Middle ear cavity. Cochlea—Cochlea. F. N.—Facial nerve. O.W.—Oval window. Ves—Vestibule. S—Sacculus. U—Utriculus. M—Macula. MO—Modiolus. 8N—8th nerve. I.A.M.—Internal auditory meatus. C.—Cochlear division of the 8th nerve. V.—Vestibular division of the 8th nerve. D.E.—Ductus endolymphaticus.

Johns Hopkins Hospital, where they were prepared for us. The capacity of their laboratory is being taxed with their own excellent tested material. Dr. Crowe and Dr. Guild instructed our group in their technique of preparation.

My presentation is of the normal histological structure.

I. This section considers the temporal bone as a whole, cut in a horizontal plane or parallel to the long axis of the petrous and at

\*Read before the New York Academy of Medicine, Section of Otology, Oct. 10, 1930.

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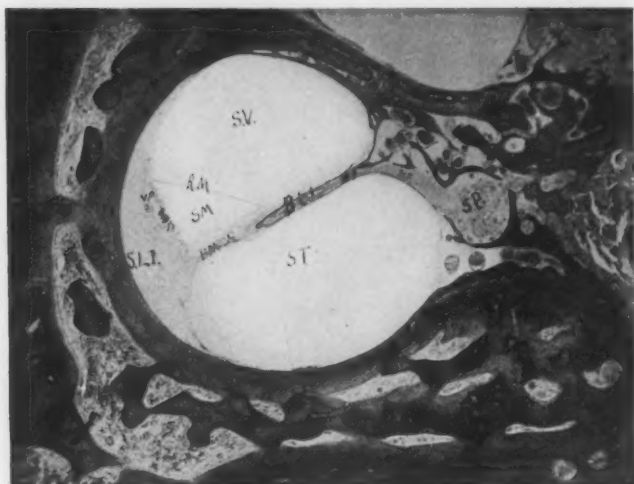


Fig. 4. Human temporal bone, showing ganglion cells and their entrance into the bony spiral lamina.  
 S.V.—Scala vestibule. ST—Scala tympani. BSL—Bony spiral lamina. NF—Nerve fibres. S.L.I.—Spiral ligament. S.V.A.—Stria vascularis. VP—Vas prominens. BM—Basilar membrane. C—Corti's organ.

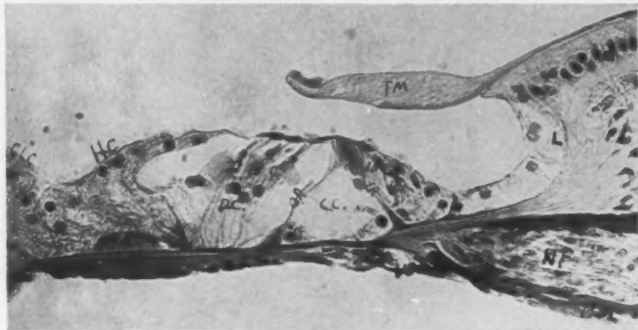


Fig. 5. Guinea pig temporal bone (from collection of Dr. Gales). Corti's organ, showing nerve terminals.  
 TM—Tectorial membrane. L—Limbus. OHC—Outer hair cells. IHC—Inner hair cells. C.C.—Canal of Corti. VS—Vas spirale. OR—Outer rod. IR—Inner rod. D.C.—Deiter's Cells. CLC—Cells of Claudius. HC—Hensen's cells. OBC—Outer base cell. IBC—Inner base cell.

Through these sections it is possible to trace the auditory or eighth nerve from its entrance into the internal auditory meatus, through the modiolus and spiral ganglia, through the bony spiral lamina, to its termination in the hair cells of the end organ of Corti.

121 East 60th Street.

**REPORT OF A CASE OF LATERAL SINUS  
THROMBOSIS REPRESENTING SOME  
INTERESTING FEATURES.\***

DR. LOUIS BAER, Philadelphia.

B. C., girl, age 14 years, was admitted to the Mt. Sinai Hospital, service of Dr. Fisher, on Oct. 2, 1930. Her chief complaint was fever, pain and swelling behind the right ear and severe headache.

*Previous Medical History:* Whooping cough and chickenpox at the age of 6 years. Measles at 7 years, and mumps when 9 years old. About two years ago she had an attack of acute otitis media in right ear, which lasted several weeks, discharging mucopus. Did not consult a physician. The discharge in the ear recurred frequently whenever she contracted a cold. It was usually preceded by pain and occasionally associated with headache. December, 1929, she was confined to bed for four days. Had pain in the right ear for one day, followed by discharge. She also suffered general pain. She did not call a physician.

July 10, 1930, she visited the Nose and Throat Clinic of Mt. Sinai Hospital, complaining of discharge from right ear. The following is the dispensary record:

Examination showed nasal mucous membrane slightly congested; some mucopus present in both nasal chambers. Both middle turbinates hyperplastic. Transillumination of frontals and antra gave negative findings. Tonsils fair size and diseased. Oropharynx congested. Larynx normal. Left eardrum slightly retracted. Right external auditory canal contained some mucopus. Drumhead thickened, having a central perforation. She again visited the clinic on the fifteenth, when she was registered for a tonsillectomy.

Present illness began seven days prior to admission to the hospital, when she was suddenly taken ill with severe headache, sick in the stomach and general weakness. She attended school the next two days, although the headache persisted.

Four days before admission she developed fever and pain in the right ear. Her family physician prescribed a medicine and advised irrigation of the ear. Two days later a swelling developed behind

\*Read before the Philadelphia Laryngological Society, Dec. 2, 1930.

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the ear and she had two chills. She was advised by her physician to go to the hospital. The chill recurred the day before, and the day of admission to the hospital.

*Examination:* Patient appeared fairly well nourished, face flushed, and suffering pain. Temperature,  $101^{\circ}$ . Pulse, 94. Respiration, 26. Right external auditory canal was very much swollen, having a furuncle on the posterior wall. Some thick mucopus could be seen. The drumhead could hardly be visible, nor could examination be made of the posterosuperior wall. Movement of the auricle elicited a great deal of pain. There was marked tenderness and swelling over mastoid. Left ear normal. There was congestion of mucous membrane of the nose and oropharynx.

Urinalysis was negative, except a slight trace of albumin.

Blood examination on admission gave H., 85 per cent; R. B. C., 4,270,000; W. B. C., 19,450; P., 76; M., 14; L., 7.

Early the following morning, 3 o'clock, she had a chill, followed by a rise of temperature to  $106^{\circ}$ , coming down to  $99^{\circ}$  at 6 a. m., and rising to  $102^{\circ}$  at 9 a. m. Blood culture taken right after the chill was found to be contaminated. Physical examination of the chest and abdomen was negative. The X-ray report was as follows:

Right mastoid shows complete absence of cellular structure with marked sclerosis, suggesting chronic mastoiditis; necrosis at the tip. Sinus not well defined. Left mastoid, there is evidence of chronic mastoiditis with sclerosis. Sinus well defined,  $1\frac{1}{2}$  inches posterior to canal wall, and appears normal. There was no spontaneous nystagmus in any direction. Hearing was poor to low tones but  $c_4$  was heard well.

About 11 a. m., while attempting to do a Barany test, she had another chill. Temperature,  $101^{\circ}$ .

In view of the daily chills for the last four days, severe headache and leukocytosis of over 19,000, we thought that we were dealing with a mastoiditis associated with some intracranial complication. The X-ray report was unreliable, because of the interference of the large superficial abscess of the soft tissue from the furuncular condition.

She was taken immediately to the operating room for operation. *Operation:* Postauricular incision. A large abscess in the soft tissues, containing thick pus, was evacuated. Periosteum was adherent. The outer table was not broken through, but around the tip the mastoid appeared bluish and thinned out. On chiselling away the outer table over the antrum, there was a gush of thin, foul-smelling pus under pressure, coming, as it was found later, from a perisinus abscess at its bend. The entire mastoid was soft and necrotic. It

was necessary to make another incision, about  $1\frac{1}{2}$  inches long, perpendicular to the first. The entire sinus plate was necrotic. The sigmoid sinus was exposed down to the jugular bulb. The sinus wall was fibrotic, pale yellowish in color, and felt empty from the knee down to near the bulb. At the bulb, the sinus felt hard and well organized; its wall was pale bluish in color and intact. No fistula in the wall of the sinus visible. The knee was dark blue in color and covered with thick granulations. It felt solid. Anterior to knee a great deal of pus was found—perisinus abscess. The lateral sinus beginning about one-third-inch from the knee was followed posteriorly to the Torcular Herophili, a groove was chiselled out in the skull over the lateral sinus, extending to about the external occipital protuberance, had the appearance and consistency as the lower part of the sigmoid. A large perforation, about three-quarters of an inch long, in the sinus wall was found.

The sinus near the Torcular Herophili was hard and well organized; the wall appeared pale bluish in color. The emissary vein was also thrombosed and obliterated. The dura of the middle fossa was exposed, about the size of a five-cent piece. It was covered with granulations and some pus was cleared away. The mastoid was thoroughly cleaned of the granulations, pus and debris. No attempt was made to disturb the organized thrombus at either end or ligate the jugular. The wound was packed with iodoform gauze, sutured and dressed. The smear of the wound was lost before reaching the laboratory.

Immediately after the operation the temperature came down to  $100^{\circ}$ , rising again to  $102^{\circ}$  eight hours after the operation and coming down two hours later to about normal, and has remained normal since.

Patient rallied from the operation and felt good the following day. On the fifth day after the operation, she developed a horizontal nystagmus to right, affected side. It disappeared after the packing was changed; the wound was then packed very lightly. Two days later, or the seventh day after the operation, she developed a vertical nystagmus upward that lasted for four days. Patient gradually improved. Was out of bed on the fourteenth day, and discharged from the hospital on the twenty-fourth day.

The wound by that time was completely healed. Several blood examinations were made during her convalescence and showed a leukocytosis, 12-13,000.

Eye examination on the sixth day after the operation, because of the nystagmus, reported normal eye grounds. No papilledema on the

right side. Two Barany tests were done, one when still in the hospital, the other after she had left the hospital, on Nov. 15, 1930. The responses obtained on turning and douching were about normal.

There is no doubt in my mind that the thrombosis of the sinus in our patient did not occur during the present illness. The appearance and consistency of the wall of the sinus with a perforation, the solid organized ends at the jugular bulb and the Torcular Herophili led me to believe that the thrombosis was of long duration. It had formed some time between the initial attack of acute otitis media and the present illness, although neither the patient nor her grandmother, with whom she made her home, can recall her ever being very sick during the last two years, with symptoms referable to sinus thrombosis, as to necessitate seeking the advice of the family physician. It is quite possible that the thrombosis had taken place during one of the recurrent attacks of discharge from the ear when she contracted a cold, the infection spreading to the mastoid cells, which became filled with infected secretions of a low virulence. The sinus being continually in contact with this infected material, its wall became involved, causing the intima of the vessel, as Todd<sup>1</sup> well described, to throw out sticky exudate, which picked up the red and white corpuscles and other blood contents, forming an aseptic thrombus, which later became organized because the infection was mild. When another attack of discharge of the ear occurred, again involving the mastoid cells and sinus wall, which became necrotic, the thrombus within became infected, forming an abscess. Being unable to discharge the fluid pus within the blood stream because of the ends of the thrombus being organized and sinus being sealed off, the vessel wall ruptured, the pus evacuated within the mastoid cells and carried off through the middle ear into the external auditory canal. This will explain the perforation found in lateral sinus in this case. That all this may take place without the patient having any ill effects is quite possible.

Holderman<sup>2</sup> reports about 30 cases reviewed in the literature and one of his own of afebrile sinus thrombosis. Few of the cases reported did not give a history of past or present symptoms referable to sinus thrombosis, the thrombus being discovered accidentally at operation. Several cases of this series gave similar findings, as in our case: sinus obliterated and broken through.

This may also explain the negative findings of the eye examination. No papilledema was found on the right side because collateral cranial circulation had ample chance to establish itself after the sinus became thrombosed.

The present illness and symptoms of pyemia were due either to the acute infection of mastoid or the perisinus abscess at the knee, the absorption into the system taken up by some other blood vessels or lymphatics, or because of the extradural abscess. Whether the furunculosis of the external ear and the abscess in soft tissue had anything to do to aggravate the infection of the mastoid, I am not prepared to say.

#### CONCLUSIONS.

This case bears out well known clinical observations that: 1. Lateral sinus thrombosis may occur without giving patient any ill effects. 2. When the ends of the thrombosed sinus are found to be organized and obliterated, no attempt should be made to disturb the sinus or ligate the jugular.

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1207 Spruce Street.

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### NOSE BLEEDING.

DR. JOHN J. RAINEY, Troy, N. Y.

The symptom nose bleeding in most instances is a local vascular disturbance and is rarely physiological. Not infrequently it is due to general conditions, such as chronic nephritis, arteriosclerosis, heart disease, leukemia and anemia. Often the occasion of the visit to the office for nose bleeding results in the discovery of the underlying cause. Trauma, atrophic rhinitis, telangioma, malignancy or cyclic menstruation may be the factor.

The principal areas of nose bleeding are locus Kisselbach; on the septum opposite the anterior end of the middle turbinate and high up from the anterior ethmoidal veins. In more than 90 per cent of cases the bleeding comes from locus Kisselbach. This area is sometimes called Little's area. It is situated on the septum about one-half-inch behind its anterior border and about one-fourth-inch from the floor where the sphenopalatine, anterior ethmoidal and a septal branch of the coronary arteries and their accompanying veins anastomose. The mucous membrane here is very thin, as it is just beyond the junction of the skin of the upper lip and the mucous membrane of the septum. The vessels are superficial and dust par-

ticles of infinite variety lodge in the vestibule of the nose and on locus Kisselbach.

Attempts to remove these particles produce a moth-eaten condition of the mucosa, crusts form and are removed again and again. As a result of this trauma a blood vessel is ruptured and a succession of bleedings follow. The ulceration may often result in perforation. It is generally small and only involves cartilage. In patients who come for relief from bleeding and show no evidence of ulcer on Little's area, the cause is generally constitutional.

Most bleeding ceases spontaneously, especially in children. Often, however, direct treatment is necessary. A plug of cotton is placed against the septum and the nostrils pinched against the septum. (This advice is generally given over the phone and always is successful with children, but often fails with adults). Occasionally it is necessary to pack the nose at home or in the office.

In trying to effect a cure, whether the cause is local or general, 2 per cent cocain is applied to locus Kisselbach and with a silver nitrate bead the bleeding point is closed. This is effective with children, but in some adults several treatments are necessary and often after a period of weeks or months the bleeding returns.

Many patients with the history of frequent bleeding and unsuccessful treatment come to us. They want, if possible, permanent relief. Many years ago I used the cross incision method on the septum, later I used radium. I find the procedure that gives the best results is the submucous resection of the nasal septum. The amount of cartilage removed depends upon the size of the ulceration. If a bony deflection is present, the classical submucous resection may be performed instead of the modification.

More than sixteen years ago I operated a patient with ulceration of Kisselbach's area of one side. The healthy mucoperichondrium adhered to the diseased side and the patient has had no bleeding since that time. I have performed this operation on more than 100 patients since then with very good results.

In atrophic rhinitis many patients have bilateral ulceration about to perforate. This causes considerable bleeding and cauterization is of slight benefit. Submucous resection destroys the perforating ulcer and a small perforation results with a healthy circumference. These patients claim that after the operation the scabbing of the nose is lessened, or at least is less troublesome.

In conclusion, the submucous resection of the nasal septum provides a cure for bleeding from locus Kisselbach in those adults in whom conservative measures have failed.

104 2nd Street.



## LABYRINTHINE-GASTRIC REFLEXES.\*

DR. JAMES E. LEBENSOHN, Chicago.

In seasickness the feeling of nausea is the dominant sensation. Associated with this is pallor and dejection, sweating, salivation and pilomotor changes, so-called goose flesh, but these phenomena accompany nausea, howsoever produced, and consequently may be presumed to be a reflex spread to the sympathetic system.

Studying the stomach after a barium meal with the fluoroscope, Roccavilla<sup>1</sup> found that in normal individuals a galvanic stimulation of the labyrinth of 4 milliamperes for 30 seconds, or an irrigation of the ear with 500 c.c. of water at 15° C. for 60 seconds, almost always caused a violent gastric contraction, the pylorus and cardia tending to approximate spastically. Despite this radiologic finding, the subjects generally did not experience any subjective symptoms. This labyrinthine-gastric reflex was not altered by atropin, but somewhat increased by the injection of adrenalin.

Podesta<sup>2</sup> confirmed these findings of Roccavilla, and extended his research to pathological subjects.

After personally verifying with the fluoroscope the work of Roccavilla, I continued the investigation with a graphic study of gastric motility. In this method, a stomach balloon is swallowed, connected with a water manometer, and a tracing made on the smoked paper of a revolving kymograph. The balloon is emptied of air before swallowing and inflated to a pressure of about 5 c.m. of water after it has reached the stomach. In a study of oculogastric reflexes<sup>3</sup> and car-sickness<sup>4</sup>, I employed the same method of following gastric motility, and in the former article are illustrations of the apparatus.

Nystagmus in itself produces a negligible effect on gastric activity, as illustrated in the upper part of Fig. 1. In this case optokinetic nystagmus was induced by revolving a striped cylinder to and fro before the eyes. On the other hand, douching an ear with cold water effects an immediate and remarkable rise in gastric tone. When the douching is stopped, a prompt fall of gastric tone follows to below its original level, and a cessation of gastric motility until some minutes after the sensation of vertigo has passed. The same phenome-

\*From the Department of Physiology, Northwestern University Medical School.

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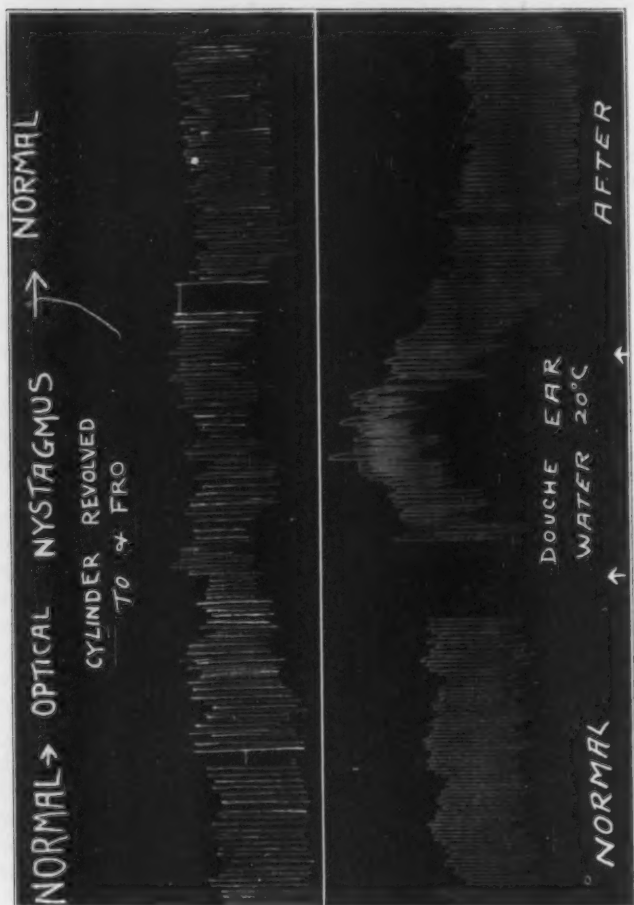


Fig. 1. Kymographic tracings of the movements of the empty stomach. The induction of optokinetic nystagmus causes only a slight change in the curve of gastric motility. After stimulation of the labyrinth with cold water, there is an initial contraction, due to stimulation of the adjacent skin nerves, followed by a marked decrease in gastric tone and an inhibition of gastric motility.

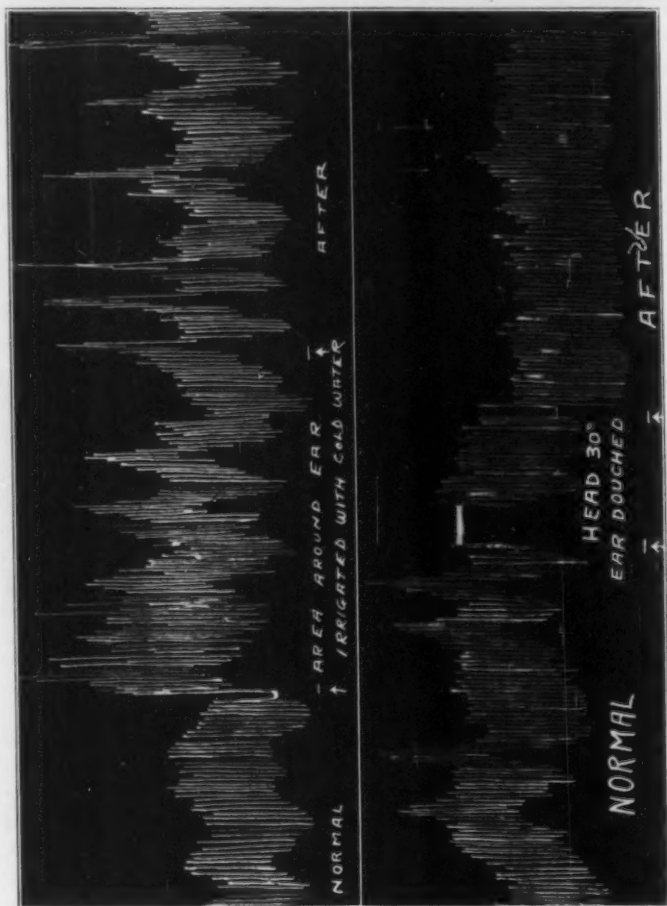


Fig. 2. Kymographic tracings of the movements of the empty stomach. Irrigating the auricle and face with cold water causes a prompt and sustained increase in gastric contractions, as shown in the upper curve. Hunger contractions, developed during the irrigation, continue with unabated vigor afterward. In the lower curve it is shown that after the labyrinth is stimulated with cold water, hunger contractions are stopped, and a marked loss of gastric tone accompanies the ensuing nausea.

non is induced by irrigating the ear with hot water, but the use of lukewarm water occasions practically no change in gastric motility.

My further studies show that this initial contraction is a response to stimulation of the adjacent skin nerves and is not due to the labyrinth. Simply irrigating the auricle and face with cold water causes a prompt and sustained increase in gastric contractions (see Fig. 2). The effect is purely tonic, and may go on to hunger contractions during the irrigation, which in that case continue with unabated vigor afterward. But, after irrigating the area around the auricle with cold water, if the douche is then directed without pause toward the labyrinth, no further increase in gastric activity occurs. Stimulation of other peripheral nerves, as accomplished by irrigating the chest, feet and arms with cold water, is also somewhat tonic, and has a tonic after-effect, though in much less degree, the stomach occasionally going into a hunger period shortly after the stimulation.

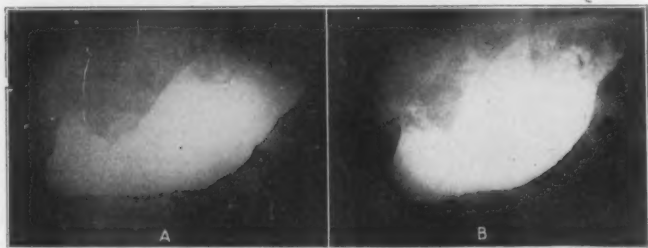


Fig. 3. A, the normal stomach after a barium sulphate meal; B, after incipient nausea is induced by douching ear with cold water. The pylorus is closed and the fundus is relaxed and atonic.

Whenever the irrigation of the aural canal excites vertigo and nystagmus there is regularly a depressive after-effect. Hunger contractions which may have continued through the initial irrigation stop with the cessation of douching, if not before, and a loss of gastric tone occurs, depending on the degree of nausea induced (see Fig. 3).

The effects of galvanic stimulation are similar. Unless the electrodes are directly in the aural canal, vertigo and nystagmus are seldom produced. An electrode over the mastoid area merely causes a local skin irritation, which is always accompanied by a sustained gastric contraction, the degree of which depends upon the milliamperage used. The after-effect is consistently tonic, and hunger contractions present before stimulation continue vigorously afterward.

However, with binaural stimulation, marked vertigo and nystagmus are easily produced with 5-6 milliamperes current. The first few

experiments in a day's series would occasion, after stimulation, nausea and a fall in gastric tone. Succeeding experiments might occasion no gastric distress nor loss in gastric tone, but an inhibition of rhythmic gastric motility if previously present.

These findings corroborate the current physiological views of the mechanism of nausea. Even before nausea comes to consciousness, Colley<sup>5</sup> observed definite motility disturbances in the stomach; the pylorus is in constant occlusion and the fundus in long-continued atony with the cardia relaxed. On the basis of fluoroscopic studies, Keeton<sup>6</sup> noted that "a sudden cessation of the antral waves with a relaxation of the fundus almost always indicates that the patient is nauseated. This relaxation is a necessary condition for antiperistalsis." The studies of physiologists<sup>7, 8, 9, 10</sup> have demonstrated that this gastric inhibition is accompanied and in fact preceded by duodenal antiperistalsis.

In a series of animal experiments, Spiegel and Demetriades<sup>11</sup> investigated the effects of labyrinthine stimulation on the motility of an increase occurs in both the amplitude and tone of the pendulum loops of small intestines. Normally the latter exhibit 13-15 pendulum movements per minute. On stimulation of the labyrinth with a cold water douche, the drum membrane having been previously perforated, movements, the effect lasting about 10 minutes, which is long after the nystagmus has disappeared and the blood pressure returned to its normal level. This same reaction was obtained on curarized animals, demonstrating that the phenomenon is not due to action of the abdominal wall musculature. Stimulation of the skin is, however, a factor. On removal of the outer ear, and infiltrating the wound and middle ear with cocain, no response results until after a latent period of a few seconds. If the labyrinth is now injected with 20 per cent cocain through the foramen rotundum after the method of De Klejn<sup>12</sup>, this latter response is also eliminated. Douching the control side, however, still produces the original reaction. This labyrinthine-intestinal reflex is independent of the cortex, continuing after separation of the midbrain. The reflex is not affected by section of the splanchnic nerves, which indicates that it is mediated through the vagi.

#### CONCLUSIONS.

1. That reflexes occur from the labyrinth to the digestive tract has been experimentally demonstrated in animals and man.
2. The initial gastric contraction following caloric and galvanic stimulation of the labyrinth is not a labyrinthine reflex, but is due to

the associated stimulation of the trigeminal nerve and the auricular branch of the vagus.

3. The impulses from the labyrinth probably cause antiperistaltic waves in the small intestine and duodenum. The sensation of nausea arises from antiperistalsis in the duodenum. The impulses from the labyrinth to the stomach are entirely depressive: gastric hunger contractions are inhibited, and when nausea is induced a marked decrease in gastric tonus regularly results.

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25 East Washington Street.

## A CONVENIENT METHOD OF SHRINKING THE SPHENOID DRAINAGE AREA.\*†

DR. JOEL E. PRESSMAN, Los Angeles.

In a previous communication<sup>1</sup> a method was described by which shrinking solution could be applied to the orifice of the Eustachian tube by spraying through the mouth with the spray tip placed behind the soft palate. This method proved of considerable value in acute upper respiratory infections where stuffiness of the tube, tinnitus, earache and diminution in acuity of hearing resulted from swelling of the tube mouth. Since that time it has been found advantageous to apply this method of approach to the postnasal spaces in other conditions, especially where shrinkage of the tissues about the region of the sphenoid ostium and posterior ethmoid cells is desired. This method was first used in a case where shrinkage anteriorly through the nose was impossible and yet institution of proper drainage was essential for the relief of an acute sphenoid sinusitis, as the following case history demonstrates:

*Case Report:* During the winter of 1929-30 the patient complained of frequent attacks of "head colds" characterized by nasal obstruction especially on the right and a postnasal purulent discharge, often accompanied by occipital and temporal headaches. Examination revealed an enlarged right middle turbinate with a high deviation of the nasal septum to the right impinging upon the enlarged turbinate. No pus was seen by examination with the nasal speculum, but posterior rhinoscopy revealed a purulent postnasal discharge, which on one occasion was seen to be coming from above the middle turbinate, apparently from the sphenoid or posterior ethmoid cells. Shrinkage of the sphenoid area was attempted by the usual method of spraying through the nose, but without effect. It was likewise found impossible to reach the sphenoid ostium with an applicator because of the high deviation of the septum and the enlarged turbinate obstructing approach to this area. Temporary relief was obtained by saline douches and inhalations of steam. A submucous resection and turbinectomy was suggested and arrangements made to carry it out. Before this could be performed the patient presented herself with an especially severe attack, causing excruciating occipital headaches, sufficiently severe to keep her awake throughout the night and pre-

\*From the Graduate School of Medicine, University of Pennsylvania.

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vent her from carrying on usual household duties throughout the day. Examination at this time revealed no pus by any method of examination but the mucous membrane of the nose was markedly congested and reddened. The usual temporizing measures and efforts to shrink the sphenothmoidal area failed to bring about relief. Because of the obstruction caused by the enlarged turbinate and deviated septum, sprays through the nose and applications with a cotton-tufted probe were without benefit since the obstruction made it impossible for the solution to reach the desired area. Bearing in mind the success of our method of shrinking the Eustachian orifice through the mouth and the urgent demand of the patient for relief, an effort was made to apply shrinking solutions to the posterior nares, *via* the oral route. By the method to be described (Fig. 1), a solution of cocain was sprayed into the posterior nares. Within a few minutes



Fig. 1. Demonstrating the position of the spray tip. Note that the nozzle rests on the posterior pharyngeal wall and is turned to a position a little beyond a right angle. It is slightly rotated toward the side to be sprayed.

a large gob of pus dropped into the pharynx and was expectorated. Relief from the severe headache was almost immediate. This method of shrinkage was used for two or three days, after which the acute attack subsided, the patient having been kept free from pain by repeated shrinking.

This case represents an instance in which shrinkage of the sphenothmoidal area was essential for the relief of an acute sinusitis and yet this could not be obtained through the usual method of approach. Shrinkage by the postnasal route was easily and rapidly accomplished on a number of occasions, bringing about great relief from the acute symptoms. It is in such a condition as this that the new method of approach is especially recommended, but it is my impression that this method through the mouth offers a better route for the installa-

tion of medicated solution to the sphenothmoidal area than applications through the nares, even in those instances where pathologic abnormalities do not cause blockage of the passageways.

Experiments were conducted on the split head of the cadaver to determine the distribution of solutions sprayed into the choanae through the mouth. It was found that by properly adjusting the tip of the nozzle, a straight line projected from it passes directly through the sphenothmoidal recess.

A solution was then sprayed into the area and it was observed that this solution spread over the posterior end of the middle turbi-



Fig. 2. With the spray tip in position a probe inserted into the lumen of the nozzle passes upward directly into the sphenothmoidal recess.

nate, base and anterior wall of the sphenoid sinus, the sphenothmoidal fissure, posterior extremities of the middle and superior meati and the superior turbinate, as well as the torus tubarius.

When an excess of solution was sprayed into this area the contour of the superior and middle turbinates directed the back wash of the solution directly into the sphenothmoidal fissure and even into the sphenoid sinus itself, through the ostium (Fig. 2).

It was found that a better distribution could be obtained if the head were turned on its side, as though a patient were being sprayed while lying down, turned on the side to which the spray was directed.

*Method:* The method of approach is as follows: The tip of the ordinary DeVilbiss spray is turned upward to a little beyond a right angle. It is then inserted into the mouth on one side of the uvula until it rests on the posterior pharyngeal wall. It is then slightly rotated toward the side to be sprayed so that the tip of the nozzle looks directly at the sphenothmoidal area.

Air pressure is then applied to the spray bottle. It has been found advantageous to have the patient lie on or bend the head towards

the side to which the solution is applied, since this makes for a better distribution. If there is a tendency toward gagging, the patient is directed to hold as still as possible, the physician utilizing the brief period between paroxysms for application of air pressure but not removing the spray tip from its position during the procedure. A preliminary painting of the throat with a mild solution of cocain does away with enough of the tendency towards gagging to enable the spraying to take place without difficulty.

*Discussion:* Since we first used this method it has been tried on a number of patients in which it seemed to be indicated, with very

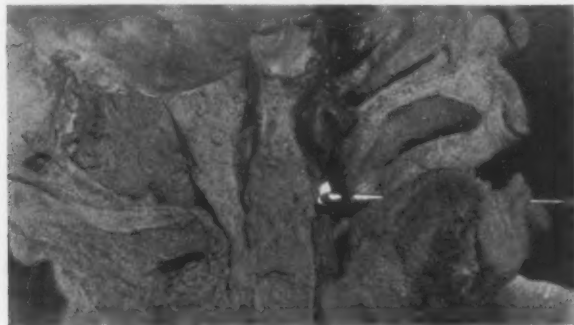


Fig. 3. The distribution of a solution of argyrol from a single spraying according to the method described. Note especially that it occupies the sphenothmoidal area and posterior end of the middle turbinate. If more generous amounts are applied, the fluid often, in the cadaver, at least, enters the sphenoid sinus through the ostium.

satisfactory results. We have attempted to observe with the nasopharyngoscope the distribution of solutions of argyrol sprayed in this manner. For some reason or other it is difficult to demonstrate the presence of argyrol in the nose with this instrument, even when it is sprayed directly into the nose and the anterior portions of the nasal chamber examined. However, on two or three occasions we have used strong shrinking solutions and have been able to demonstrate to our satisfaction by nasopharyngoscopic examination that marked shrinkage of the area under discussion had taken place.

We therefore suggest that this method be attempted in cases similar to the one above described. It has also proven useful in our hands for cocaineization of adenoid masses to be removed under local anesthesia and in other procedures where local anesthesia in the region of the posterior nares is desired.

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## PRIMARY DIPHTHERIA OF THE ADENOIDS.\*

DR. ALEXANDER F. LASZLO, New York.

Although diphtheria of the pharynx, larynx or the nose is a very common disease, diphtheria involving the epipharynx alone is very rare. Jurasz reports a case in 1904, in which a 29-year-old woman came under his examination with an involvement localized only in the postnasal space. Glass mentions that he saw cases in adults, but he does not mention any specific case. Aside from these, there is no mention in the literature of similar cases.

A typical case of primary diphtheria of the adenoids came under my observation in the Nose and Throat Department of the Post-Graduate Hospital (Dr. Hutchinson's service). The report of the case is the following:

E. S., 13-year-old high school boy, came to the hospital on Dec. 4, 1928, for removal of the tonsils and adenoids. The patient had been sent to the Operative Clinic by the Afternoon Clinic, where he had gone a few days previously with the complaint of nasal twang of the voice, some speech defect and slight difficulty in swallowing. The patient was supposed to have had general anesthesia, but on the morning scheduled for the operation he did not feel perfectly well, and was sent to me for examination before he was admitted. Upon examination I found the following picture: Temperature by mouth, 100°; pulse, 116; general weakness and ill feeling. No special pain in any part of the body; no complaint of sore throat or cold in the head.

*Physical examination* showed mucous membrane of the nose perfectly normal. No discharge or bleeding from the nose. Tonsils had been removed previously, and only very small particles of lymphoid tissue, perfectly normal in appearance, could be seen on both bases. No inflammation or congestion. Granular pharyngitis could be seen on the posterior pharyngeal wall, and on top of each nodule was a small, white spot, which did not appear to be membranous. There were about five or six such nodules present. The white spots were not larger than a pinhead.

*Rhinoscopy posterior* showed quite a bit of adenoid tissue, covered with a grayish-white material, which proved to be membranous. After

\*From the Nose and Throat Department of the New York Post-Graduate Hospital and Medical School.

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trying to remove this membrane, there was slight bleeding. The membrane did not go over to either the lateral side of the nasopharynx or to the anterior part of the soft palate, but covered only the adenoid tissue. The posterior nares were opened on both sides. There was no congestion of the posterior part of the turbinates or the mucous membrane of the septum.

Suspecting diphtheria, we isolated the patient immediately, and took smears and cultures. After this the patient was sent home, with a letter to the family physician, in which we advised that diphtheria antitoxin be given immediately. The smear showed many pus cells, many bacilli and streptococci. The culture was returned and showed moderately heavy, colorless growth, cocci in pairs, bacilli present, and diphtheria bacilli present.

*Diagnosis* from the culture showed diphtheria bacilli present in small numbers.

The family physician gave 5,000 units of diphtheria antitoxin, and the patient's condition improved rapidly. A few days later he was back to his normal condition. We asked the family physician to take some cultures two week after the injection was given, and then at intervals of one week, and all the cultures were negative.

The patient returned to the hospital on Jan. 18, 1929, when examination showed large adenoid tissue, normal in appearance. I again took a culture, and this proved to be negative. A few days later, about two months after the patient had first appeared at the hospital, I removed the adenoid tissue and the tags from the tonsil region under general anesthesia, and specimen was sent up for microscopic examination.

Report of the laboratory showed specimen consisted of two pieces of adenoid tissue, about 2 c.c. The surface is lined by stratified squamous epithelium. The lymphoid tissue shows large lymphoid follicles with large germinal centers. The crypts are deep.

*Diagnosis:* Hypertrophy. Bacteriological examination negative for diphtheria. The patient made an uneventful recovery.

The above case is a very classical case of primary diphtheria of the adenoids, and we were able to make a diagnosis as the patient was quite intelligent and co-operated with us in the examinations. He had quite a wide postnasal space and he was not a very hypersensitive type of person.

The case proves the necessity of a thorough nose and throat examination before every operative interference, especially when an obscure case comes under observation.

124 East 84th Street.

## PERFORATING TUBERCULOUS ULCER OF PALATE. CASE REPORT.\*

DR. DAVID H. SOLO, Philadelphia.

J. D., negro, age 35 years. C. C.: Came to the Nose and Throat Dispensary of the Jefferson Hospital one month ago, complaining of pain in the roof of his mouth and had difficulty in swallowing. He even found it painful to talk.

*Family History:* Married, has two children living and well; his wife is living and well; no history of any miscarriages, no history of any venereal infection.

*Past History:* Measles in childhood, remembers no other diseases other than an occasional cold. Following his return from France after the war, he developed pulmonary tuberculosis and was sent to a sanatorium.

*Present illness* (that of the ulcerated palate) began about three years ago with a small superficial ulceration of the soft palate. This ulcer kept getting larger in spite of treatment, which consisted of the use of mouth washes, etc. The ulcer gradually spread over the soft and hard palate until it involved all of the mucous membrane of the entire roof of the mouth. About three months ago the patient noticed a small hole through the soft palate. He had a productive cough and said he lost considerable weight in the last three months.

*Examination* of the palate when first seen showed an ulceration of the entire hard and soft palate, with a perforation 1 c.m. in diameter through the soft palate. The margins of the ulcer were not sharply outlined, but presented a sort of nibbled appearance. The ulcer itself looked copper-red in color and was scantily covered with a thick, yellowish secretion. Scattered over the ulcer were a few areas of granulation tissue. Surrounding the margins of the perforation the tissue was much redder than that of the ulcer. Examination of the nose and throat showed nothing of interest; no examination of the larynx was made because the patient was unable to co-operate.

*Laboratory Findings:* Blood Wassermann was negative, a provocative Wassermann was negative. Cultures from the palate showed the staphylococcus albus (predominating) and the streptococcus non-hemolyticus. A section taken from the palate showed the following:

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Specimen consists of two very small, soft, grayish-white pieces of tissue. Histology: Section from the small pieces of tissue reveal an inflamed and ulcerated mucosa with very marked hyperplasia of the squamous epithelium and inflammatory reaction involving the submucous tissue. The inflammatory reaction seems to be diffuse, and while there are a few giant cells present, nothing is noted to suggest a tuberculous infection. The marked hyperplasia of the epithelium is considered to be due to inflammatory reaction, rather than an evidence of malignancy.

Histologically, the lesion seems to be definitely chronic inflammatory, but there is nothing characteristic noted to indicate the type of infection; no evidence of tuberculous lesion or malignancy observed.

Diagnosis: Chronic ulcer.—(Signed) Dr. B. L. Crawford.

From the Chest Department the following report shows J. D., referred from Nose and Throat Clinic, was examined Nov. 1, 1930. Diagnosis: Pulmonary tuberculosis, far advanced. Sputum examinations, Nov. 5, 6 and 7, positive for tubercle bacilli.

X-ray of chest, Nov. 10: "There are extensive tuberculous changes involving both lungs from apex to base, with large cavities in the right apex and small ones in the first interspace on the left side anteriorly. The interlobar pleura on the right is definitely thickened. Both costophrenic angles have been obliterated either by adhesions or else there is a small quantity of fluid in each one. Both diaphragms seem to be flattened out more or less; the heart is of the long, narrow type. The whole process from the X-ray point of view seems to be an active one."

Pathology of tuberculous ulcers usually starts as miliary tubercles which develop in the submucous tissue. The margins of the ulceration are irregular and at first small and discrete, separated by infiltrated tissues; these break down and produce a mouse-eaten appearance. There is no surrounding zone of congestion or inflammation as seen in other ulcers. The surrounding mucosa is pale and anemic. The ulcer is bathed in small amounts of mucus. Cervical adenitis is usually present. The ulcer tends to spread laterally and not deeply. Scattered over the ulcerated area and on its margins may be found small, red granulations, interspaced with yellow or grayish pinhead spots.

*Differential diagnosis* of tuberculous ulcers from ulcers caused by syphilis, diphtheria and lupus. Tuberculous ulcers are superficial, pale and worm-eaten and without inflammatory borders. They are seldom primary in the mouth or pharynx. They are more painful



than syphilitic ulcers and there is less excavation in tuberculous ulcers. The Wassermann reaction is negative in tuberculosis.

In diphtheria there is a pinkish membrane, which is removed with difficulty and leaves a bleeding surface. The margins in diphtheria are deeply inflamed, in tuberculosis the margins are pale. By microscopic examination in diphtheria we find the Klebs-Loeffler bacillus and under treatment the diphtheritic ulcers tend to disappear in a few days, while the tuberculous ulcer gradually extends and gets larger. From lupus the diagnosis is much harder; in lupus the development of the ulceration is slow, while in active tuberculosis there is a more rapid ulcerative process. There is usually no pain or rise in temperature in lupus. There are nodular deposits near the ulcerate areas in lupus, none in active tuberculosis. In lupus cicatrices are found over healed areas; rarely are these found in tuberculosis.

*Prognosis* is nearly always fatal, especially so when the lesion is secondary to an active process in the lungs.

*Treatment* at the best is only palliative. The galvanic cautery and various destructive acids have been advocated, but without much success.

1602 Nedro Avenue.

## THE PITFALLS OF LOCAL TONSILLECTOMY.\*

DR. HARRY NEIVERT, New York.

Your Chairman has invited me to give a short dissertation on "The Pitfalls of Local Tonsillectomy." I have written some thoughts which have impressed themselves on my mind as the result of observing the work of a great many operators—some good, some bad, some indifferent. From each one I have learned something, and I have come to the conclusion that local tonsillectomy is an art. It requires certain attributes on the part of the operator not necessary in any other local operation, the most important being infinite patience and an even temperament.

One great difficulty is due to the peculiar gross anatomy. The tonsils are situated in the depth of a cavity, whose dimensions change from moment to moment, and the approach to which is constantly interfered with by the contraction of the jaw and mouth muscles and the constant movement of the tongue and pharyngeal muscles. The irritation of the saliva, mucus and blood, as well as the inhaled air, make our problem still more difficult.

When shall we say that a local tonsillectomy is successful? Shall we go by the cosmetic result alone, as seen immediately after the operation or several weeks later? From the purely surgical standpoint, yes. But *local* tonsillectomy to me is more than a surgical operation; when done properly, it is an accomplishment, anatomically, surgically and psychically. The last must never be forgotten in local work. When we have finished and are truly critical of our work and review the various steps, certain factors should come to our mind, which, if improved upon or overcome, should make the operation safer and less tiresome for the patient and easier and more satisfying to the operator.

To give categorically a list of the pitfalls would be uninteresting, so I choose to discuss our operation from four phases, and shall endeavor to bring forth errors of omission as well as commission. I like to think of the first phase as "The Approach." In clinic work, where we perhaps have never seen the patient before, more so than in private cases, this part is extremely important. How we talk to the patient, what we say, and our attitude towards him and his

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reaction, wins or loses his confidence in us. If our patient feels that we are interested in his welfare, that with his co-operation we will make the operation as perfect and as painless and as free from mental shock as possible, we are started properly. I do not consider my operation a success unless the patient leaves the operating chair with a smile, and I make sure that the next patient sees it.

Under this same heading we should include consideration of the past history. We should be alert to discover anything which may interfere with a good result. We should not operate too soon after an acute illness, and especially after an acute tonsillitis, or peritonsillar infection. I feel it is reprehensible to do a tonsillectomy when a quinsy is present. Dixon and Helwig, of Kansas City, in the October, 1930, Transactions of the American Academy of Ophthalmology and Otolaryngology, report eleven cases of thrombophlebitis of the internal jugular vein following acute tonsillitis. They state that "all forms of surgical trauma to acutely inflamed tonsils or peritonsillar spaces should be avoided." We should also be sure that the patient is not a bleeder. A history of tuberculosis, even if an arrested case, should make us hesitate about operating, because many of them, for some unknown reason, after the throat is completely healed, have a flare-up and die.

The second phase is "The Anesthesia." Here I include both the preliminary medication as well as the measures used for the local anesthesia. Personally, I do not use any preoperative medication. I feel that to attain a complete psychic as well as surgical success I want the full, undulled co-operation of the patient. I do not want anything trickling down the larynx. The cough reflex which Jackson calls the watch-dog for the larynx should not be obliterated. I still fear the possible result of combining several drugs, and for this reason, as well as others, I do not use cocain in any strength, sprayed or swabbed. We do not know the pharmacologic action of narcotic and analgesic drugs when used together, especially in the presence of epinephrin. While some are undoubtedly synergistic, others in certain individuals may be antagonistic and harmful. I know that good surgery can be done without them. For those who prefer preliminary medication, it is advisable that the patient be operated in the semireclining position.

Insofar as I can remember, I have been unable to do a local operation but twice in the past six years. In one, a man with a short, stubby neck and a huge tongue, we had a most difficult time even with ether. The second was entirely my fault. I was feeling ill and had no patience, and should not have operated. Under ether, which was done immediately, I had no difficulty.

There is little to be said concerning the choice of anesthetic for injection. Most of us use 0.5 or 1 per cent novocain with a little epinephrin. The solution should be sterile, preferably put up in ampules. Epinephrin must be used if we are to do a clean, sharp, anatomical dissection. It may be dispensed with in any of the rapid, blunt methods, whether the Sluder type instrument or the snare is used. I am not convinced that the proper use of epinephrin gives us more postoperative bleeding. There is also much contradictory evidence in the literature concerning its use in conjunction with cocain. Let me here emphasize that I do not permit cocain on the table, when I do a tonsillectomy. I have witnessed two cocain deaths in the past few years from error in filling the syringe from the wrong bottle.

Whether sterilization of the oral and pharyngeal mucosa is practical, I am very dubious. In order not to carry surface bacteria into the deeper tissues, a precise technique for injection should be developed. The fact that we have so few deep infections should be of small comfort to us. We are just lucky. Loré<sup>1</sup> in a recent investigation has shown that a straight needle whose tip is buried one-half-inch into the anterior pillar at the outer border of the tonsil has necessarily gone to the external side of the superior constrictor muscle, and is not in contact with the capsule and any solution injected dissects its way into the pharyngomaxillary space.

The method of injection and the amount used are important. I cannot see the necessity for using more than 10 c.c. for the whole operation. The less used the better. To prevent the possibility of the needle point breaking and being lost in the tissues, the needle as well as the technique must be right. I use a No. 20 gauge gold needle bent at an angle of 45 degrees. The standard is No. 23 gauge. My needle has been in use for seven years, and while it is shorter by reason of the fact that I occasionally sharpen it, it is good for many more years. The reason for the angle is that it facilitates the injection. We try to inject the fluid so that it comes in contact with capsule only. That means that injection must be made at an angle. On the posterior pillar we inject along the line where the mucosa is reflected on to the tonsil. We try not to inject into muscle because constriction of muscles and vessels contained therein lasts longer than the operation. It is better that we see the bleeding at the time of operation than several hours later. Injections along the anterior pillar are made through the muscle to reach the capsule. Injections through the plica semilunaris and plica triangularis may be made deeply with safety because the potential areolar spaces lateral to each

are easily distended without penetrating muscle. The main injection is made by pulling the tonsil forward and toward the uvula. This makes the lateral surface bulge and leaves a depression just lateral to it. By inserting the curved needle into this depression so that it hugs this bulge at about the middle of the tonsil we safely inject without fear of getting beyond the capsule. Whenever we make deep injections it is wise to pull back the plunger to see if we are in a vessel. Serious results may ensue if novocain is injected directly into the circulation. It is perhaps best to inject into one side and remove that tonsil before injecting the second. Our only difficulty comes in old quinsy cases. Here we inject as usual and after having liberated part of the tonsil we inject into the scar tissue as we proceed.

We now come to the third phase, "The Operation." Permit me to state at the very start that I firmly believe that sharp dissection with the point of the instrument always in full view is the safest, surest, least traumatic, least painful, least scar-forming and most rapidly healing method. We should train ourselves to use as few instruments as possible and have all those not immediately necessary covered by a towel. Show the patient the few instruments you are going to use and insist that he keep his eyes open. The anticipation of what is going on when one's eyes are closed makes one fear the worst.

Our greatest difficulty is with tonsils bound down by scars and adhesions. Here a little patience and a sharp knife cutting close to capsule will keep us from buttonholing the pillars and pulling away chunks of muscle which cause excessive bleeding, possible deep infection and subsequent scarring. Why not leave the scar which Nature has been kind enough to form previously? Perhaps a second attempt to heal the same wound may not be so successful.

How to make sure that one is in the proper line of cleavage is at times difficult. Yet it should not be if we start properly. Small tabs of tonsil or capsule with tonsil-bearing cells must not remain. They may give symptoms as annoying as the complete tonsil. Taking off the pillars or uvula is scarcely excusable. In most cases the use of a large loop on the snare is to blame. Also this may be avoided by dissecting at least the upper two-thirds of the tonsil before using the snare. A valuable aid in making the operation less annoying to the patient is to dissect the greater part of the tonsil, leaving the posterior pillar attachment intact until the very last. In this way most of the blood will tend to go into the mouth in the space between the teeth and the tongue, instead of down the pharynx. This can be facilitated by having the patient sit higher than the operator, with head bent slightly forward.

Occasionally we stick the patient or ourselves with the ends of the snare wire. This annoying and often painful complication I have overcome by using a snare in which the points are simply but surely hidden.

Perhaps the thing that worries us most is the bleeding. During the operation, if the bleeding interferes with proper vision, I pack a lump of loose cotton into the dissected pocket and proceed with the injection or dissection of the second tonsil. By the time I return to the first tonsil, the bleeding has practically ceased, unless a large vessel is opened. As surgeons, we must not depend on chemical agents or prolonged pressure to stop bleeding from large vessels. They should be clamped and tied.

Before we permit the patient to leave the chair we should make him cough several times. If the clots in any of the vessels are not firm, this will cause bleeding and we can put on ties then, much better than later. It is perhaps wise to tell the patient that the throat is now dry and that he need fear no hemorrhage, but inasmuch as the best men have hemorrhages, if it should happen, he should not become alarmed as it can be easily stopped.

Just one statement as to what we have found in tonsils at operation. The styloid process is frequently encountered. Rarer are bone, cartilage, cysts and tumors found. I have seen a fish bone deep in a crypt.

The fourth phase is devoted to our troubles during convalescence. The greatest is hemorrhage. Most likely due to infection, the membrane is not healthy and the clots in the blood vessels become infected, the blood either coming out directly or separating a part of the membrane with the formation of a more or less firm clot. Deaths have resulted from a thrombus getting into the brain, and complications in other parts of the body do occur. How to prevent this is a real problem. Whether it is due to the patient's lack of resistance, or improper after-care, or a faulty technique, we cannot tell.

Occasionally diphtheria bacilli invade the membrane. It is difficult to tell by inspection. A culture and smear should be made if for any reason the healing process or other symptoms are unusual.

I have seen several cases which did not develop a visible membrane. These always worry me. One had a hemorrhage on one side on the seventh day, and another on the other side on the eighth day. Both appeared to be clefts in the muscles, but were easily controlled by silver nitrate.

Excessive scarring and subsequent raising of the tongue toward the palate occasionally occurs and is very annoying. Some are oper-

ated on several times, often with little relief. Here again poor technique may be the cause, although the patient's peculiar healing powers undoubtedly have some influence, perhaps akin to keloid formation on the cutis.

In conclusion, I feel sure that most of the pitfalls may be avoided by ordinary care. If we take pride in our work, we will endeavor to continually improve our methods. And, finally, let us view the results of others with charity. Not all poor results are due to poor technique. The patient's attention to orders, his resistance to trauma, and his healing powers may not be normal. When about to criticize, recall your own errors.

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## LIPIODOL AS A DIAGNOSTIC AID IN CHRONIC PARANASAL SINUS DISEASE AND BRONCHIECTASIS.\*

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Mithoefer<sup>1</sup> recently made the observation, in reviewing a large number of cases, that there was marked improvement in general health and rapid gain in weight following the radical removal of diseased antrum tissue from an unsuspected maxillary sinus. This he cites as proof that chronic toxemia from this sinus is often a sufficient reason for the patient's ill health. We also have been impressed by this fact, so much so that we impress on all patients the necessity of complete investigation of the paranasal sinuses. If this is not done, an exenteration of the ethmoids alone will not give the results anticipated, while if the condition is recognized and a radical antrum operation is done at the same time, better results will be obtained. Too much confidence must not be placed on the plain X-ray diagnosis. An antrum may have marked hyperplasia in the deeper recesses and still give a negative lavage and Roentgenogram. It is in these cases where we find lipiodol instillations to be of the greatest value.

Gordon Berry<sup>2</sup> has shown two main classifications of the maxillary sinuses: 1. Those with small cavities and thick floors. 2. Those with large cavities and thin floors. The latter group is much the greater. In these antra with thin floors, some only one-sixteenth of an inch thick, it is very easy for an abscessed or dead tooth to stir up a latent infection in the antrum. The dental film may show no trouble and the tooth can still be the causative factor. The infection may escape into the antrum and thence into the nose. Lipiodol instillation following lavage is of great value here.

The technique of instillation of lipiodol is essentially important and the method of taking the X-ray films is also an important factor in reaching the correct conclusions. Granger<sup>3</sup> experimented with dried skulls and confirmed his findings on living heads with and without diseased sinuses. He developed a special head rest, which obviates the necessity of using the nose as one of the points of support of the head.

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and allows one to study the sphenoid sinus without at the same time studying the ethmoid cells. The various sinuses were filled with X-ray opaque material and positive identification made of each cavity by means of various positions and angles. The two anterior posterior angles found best suited were 23 degrees and 107 degrees. In our experience the 23-degree angle is best for the antra, anterior ethmoids and frontals; while the 107-degree angle is best for the posterior ethmoids and sphenoids. He<sup>4</sup> developed this technique further and obtained positive identification of the sphenoid sinus and ethmoid cells. These two anterior posterior angles, together with a lateral film, in our experience, give the most information concerning the lining membrane and outline of a sinus. These films may be either plain or stereoscopic.

There are several sources of error that must be avoided in arriving at conclusions from a sinus film. If these cavities can be filled with opaque material the chances for error are greatly lessened. The chief errors fall into two classes: interpretative and technical<sup>5</sup>. For instance, a pneumatized pterygoid process might be mistaken for a high maxillary filling in an anterior posterior film. A lateral film would correct this error<sup>5</sup>. Proetz<sup>5</sup> discounts the necessity of washing the antrum before introduction of the oil, but in our experience this procedure should be carried out. The technique of this lavage will be described later. King<sup>6</sup> stresses this lavage because of the information it may give and the ease of its performance. Anderson<sup>7</sup> mentions the avoidance of fatty embolism by its use previous to injection of lipiodol.

The sinus frontalis develops from the anterior ethmoid cells and is merely an extension of these cells into the frontal area<sup>8</sup>. Because of this relation with the infundibulum the channel thus formed often carries infectious material directly to the sinus maxillaris<sup>8</sup>. Thus a diseased antrum may be only a reservoir for an infected frontal and therefore it is imperative that a close study be made not only of the antrum but of the frontal as well.

For the injection of lipiodol into the various nasal sinuses a separate technique is required for each sinus. For the antrum we inject from 2 to 6 c.c.m of 40 per cent lipiodol in olive oil through the ostium after cocainization with 20 per cent cocain and 3 per cent ephedrin. A Pierce sinus cannula is used, through which the oil is forced, after lavage, by a record syringe. This same technique is used for lavage of the sinus before injection of the lipiodol. For the sphenoid, a long silver sphenoid cannula is inserted into the ostium following cocainization, and the oil injected as in the antrum.

For the frontals, a ureteral catheter, No. 5, is used and injection made in the supine position by means of a record syringe. Only one sinus is injected at a time and the patient is sent to the X-ray room as soon as possible after instillation of the lipiodol. As mentioned elsewhere, the technique of sinuography is an essentially important element of proper evaluation of the findings. MacCready<sup>9</sup> has used a 10 per cent solution of iodized oil, but we have obtained the best results from the use of a 40 per cent solution. In our series of 46 cases we did not have a single untoward reaction from the drug. In regard to the method of instillation into the antrums, MacCready<sup>9</sup> uses the puncture through the antral wall, but we seldom have any difficulty in entering the cavity through the normal ostium after anesthesia and shrinking. The oil normally drains from the antrum in 24 hours and from the frontals and sphenoids in less time. Slight therapeutic value can be expected from the use of this oil, although Proetz<sup>10</sup> and others report the relief of incessant headache following the injection of lipiodol for diagnostic purposes.

Skillern<sup>11</sup> says a negative X-ray report means nothing. Many cases of sinusitis sent to the Roentgenologist to determine the size of the sinuses were sent back with a negative report of sinusitis. If the rhinologist would first make a needle puncture, he would save these patients with negative X-ray films a great deal of suffering.

Another method of introducing lipiodol into the posterior ethmoids and sphenoids is the Proetz<sup>10</sup> displacement irrigation technique. This method depends upon the removal of air from the sinuses and its replacement by lipiodol by vacuum. The patient is placed on the X-ray table, face up, with head projecting beyond the end of the table. The head is bent back until the tip of the chin and the external auditory canal are in the same vertical plane. The lipiodol is then dropped into the nose and covers the ostia of the sphenoids. Gentle suction is then applied, first to one nostril and then to the other, the patient meanwhile repeating the letter "K". This suction creates a vacuum in the sinuses and when released the lipiodol replaces the exhausted air. When sufficient lipiodol has entered the sinuses, the patient assumes the erect or prone position and the X-ray films are made. Before beginning this method of instillation the mucosa is shrunk with 3 per cent ephedrin and 20 per cent cocain solution.

On page 69 of Chevalier Jackson's "Tracheobronchoscopy, Esophagoscopy and Gastroscopy," published in 1907<sup>12</sup>, appeared his plan of depositing a small amount of bismuth subcarbonate in the bronchi for the radiographic localization of a particular spot. This plan was used by him to show the relationship of the spot to a foreign body that was itself not in view, and for the localization of bronchiectatic

and abscess cavities. In 1918, he again called our attention to this method for use in the study of lung conditions<sup>12</sup>.

In 1921, Lynah and Stewart<sup>13</sup> reported the use of an emulsion of bismuth and olive oil in filling bronchiectatic cavities and lung abscesses and the recording of the subsequent shadows on the X-ray plate. Sicard and Forestier<sup>14</sup> first used lipiodol injected into the bronchi, spinal canal and other body cavities. They reported their methods and findings in 1922 and 1923. These efforts were followed by many investigations by other men. A resumé of the use of lipiodol and other contrast media by Iglauder<sup>15</sup> appeared in 1926.

In the use of these media in the bronchial tree, various means were employed. They were introduced through bronchoscopes, tubes, catheters, and by puncture of the cricothyroid membrane. In 1925, Nather<sup>16</sup> described his technique, in which he cocaineized the pharynx so that the patient swallowed the media the wrong way and so introduced it into the bronchi. Oschsner<sup>17</sup> has described a passive technique for the introduction of lipiodol into the bronchi. This method places the use of lipiodol in the tracheobronchial tree as used in diagnosis within the reach of everyone.

In bronchiectasis<sup>18</sup> there is dilatation of one or more bronchi. The dilatation may be cylindrical or sacculated and may go on to cavitation. There may be inflammation about the areas affected or so-called indurative pneumonia. The walls of enlarged bronchi are thin and so do not cast noticeable shadows on the X-ray film. But there is usually more or less inflammation about the affected bronchi. This casts shadows of density on the X-ray film and is read as peribronchial infiltration.

Bronchiectasis often follows pneumonia or whooping cough. It is sometimes a complication of pulmonary tuberculosis and quite often follows other infections, especially those of the paranasal sinuses. We have seen one case following typhoid fever. Many believe that there must be a congenital deficiency in the elastic structure of the bronchi to allow its development. Bronchiectasis may occur in any part of the lung. It is most frequently seen in the lower lobes, but may occur in the upper part of the lung. It may affect the large bronchi or the bronchioles. The large cavities most frequently occur in the hilum. However, the cavities are usually small and multiple and vary in size from 1 to 10 m.m. in diameter.

The symptom that brings this condition to our minds is cough, chronic or recurrent. It may produce much, little or no sputum. The physical signs of lung involvement are slight and obscure or absent. We venture to say that not over 10 per cent of the cases are diagnosed from history and physical examination. Sixty per cent

of the cases should be diagnosed from the X-ray film. Every patient who presents the symptom of chronic or frequent cough should be carefully examined for bronchiectasis.

Bronchiectasis must be differentiated from tuberculosis, lung abscess, gangrene of the lung, pneumonia, lung tumor and atelectasis produced by a foreign body.

In tuberculosis the lung infiltration and cavities usually occur in the upper lobes, while in bronchiectasis the infiltration, bronchial dilatation and cavitation occur in the hilum and in the lower lobes. Then in tuberculosis, one finds the tubercle bacillus, while in bronchiectasis it is not to be found except where the one condition is complicated by the other.

Sometimes it is very difficult to differentiate bronchiectasis from abscess and gangrene of the lung. An acute abscess of the lung while still single presents a large surrounding area of density as observed on the X-ray film and is hardly to be confused with the thin wall of the bronchiectatic cavity. If the lung abscess is multiple it is often impossible to make proper differentiation. In these cases the diagnosis of pulmonary suppuration is made. Gangrene of the lung presents practically the same X-ray signs as does extensive bronchiectasis, but the former is attended by the characteristic odor, and the clinician should have no difficulty in making the proper diagnosis.

Indurative pneumonia, which sometimes is produced by bronchiectasis, may produce dense shadows on the film and closely resemble the usual types of pneumonia. The possibility of lobar or lobular pneumonia can be ruled out because of the chronicity of the indurative type.

The bronchiectatic sacculations are round, with smooth walls, and do not resemble the irregular cavity formations of malignancy. In cases of atelectasis produced by dense bodies, of course the shadows of such bodies may be readily detected in the X-ray film. If the body producing the atelectasis does not produce an X-ray shadow, it may be impossible to make the differentiation by X-ray, but one must depend upon the clinical history.

If, as Oschsner<sup>17</sup> has said, 90 per cent of the patients who come to us with chronic or often recurrent cough are victims of bronchiectasis, it is well that all such patients be carefully examined for that condition. It is not best to subject patients with severe heart disease to such examination, nor is it reasonable to do so, for the cause of the cough may be determined by other means. Since the medium used in the bronchi consists of 40 per cent by weight of iodine in poppy seed oil and, as used by us, further diluted by the addition of 150 per cent of olive oil by volume, it is hardly possible that harm can

result from its use. It is even probable some good will be done in injecting this material into the bronchi and some lessening of the cough and sputum production be obtained.

#### SUMMARY.

1. Many errors in the diagnosis of sinus and bronchial conditions may be corrected by the use of lipiodol.
2. The posterior anterior film by the Granger method and one lateral film of the sinuses and posterior anterior and lateral films of the chest have been most satisfactory in the study of our cases.
3. Antrums should be washed before lipiodol instillation.
4. Shadows cast by lipiodol will show presence of polypi and thickening of mucous membrane in a large number of sinus cases and reveal the cause of chronic and recurrent cough, otherwise undetermined.
5. Little if any therapeutic benefit can be expected from lipiodol in sinus infections. Some therapeutic benefit can be expected in bronchiectasis.
6. Injection through natural openings into the sinuses following shrinking and lavage and the passive method for introduction into the bronchi have proved most satisfactory in our experience.
7. Instillation of lipiodol causes little or no discomfort to the patient.
8. X-ray films should be made immediately after the introduction of lipiodol into the paranasal sinuses or into the bronchi.
9. Diagnosis of chronic sinusitis and bronchiectasis may be made by means of lipiodol instillation in otherwise undiagnosed cases.
10. Forty per cent lipiodol in olive oil is, in our experience, the best contrast medium to use.

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## NEOSILVOL IN SINUSOGRAPHY.

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Sinusography is such a widely used and generally accepted procedure that it needs no advocate. Since Moritz Weil first injected the sinuses with aqueous suspensions of lead sulphate in 1902-03, various radiographic media have been used: sodium iodid, bismuth pastes, barium sulphate and many other substances, with more or less popularity. It was not until 1926, however, when Forestier introduced his iodized oil, that the "injection craze" spread far and wide. Since the advent of lipiodol, nearly all the body cavities have been injected: kidney pelves, cold abscesses, ventricles of the brain, spinal canal, Fallopian tubes, sinuses and fistulous tracts of all kinds. Perhaps no practitioner of medicine was more benefited by this added armamentarium than the rhinolaryngologist. It offers a method of viewing the inside of a sinus and determining just what pathologic change has gone on or is present.

It was the authors' intent to introduce a new radiographic medium in neosilvol, and we thought the idea was original; after using it for some months and reviewing the literature, it was ascertained that priority must go to Dr. Van Osdel, who used 20 per cent aqueous suspensions in the sinuses in 1928.

Neosilvol is as perfect a medium for X-ray purposes as the iodized oils, and perhaps has some advantages, so it will be presented for what it is worth.

In reviewing the literature only one reference to the use of neosilvol was found (referred to above), but the writings on the iodized oils were voluminous. Also, some of the articles refer to all the sinuses as being injected or to antra and sphenoids, but only pictures of the antra are shown. Furthermore, there are some erroneous statements as to the properties (particularly antiseptic) of the iodized oils. No frontal nor ethmoid sinuses have been injected, although there is no reason to believe that neosilvol would not be as efficacious as lipiodol in these sinuses and that it is also adaptable to use with the Proetz technique.

Varying strengths of neosilvol and different bases were used. An aqueous suspension was found perfectly adequate, but a base of K-Y

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jelly or "surgical lubricant" (P. D. and Co.) is probably better. When made up in the surgical lubricant the mixture may not run out of the sinus so easily and the patient may be injected in one building and sent to another for the Roentgenogram. At present we are using a 40 per cent mixture of neosilvol in surgical lubricant and find it thoroughly satisfactory in every respect. Perhaps good results may be obtained with even lower percentage concentration and it will be tried later on. A 20 per cent suspension is likely to prove inadequate for our purpose.

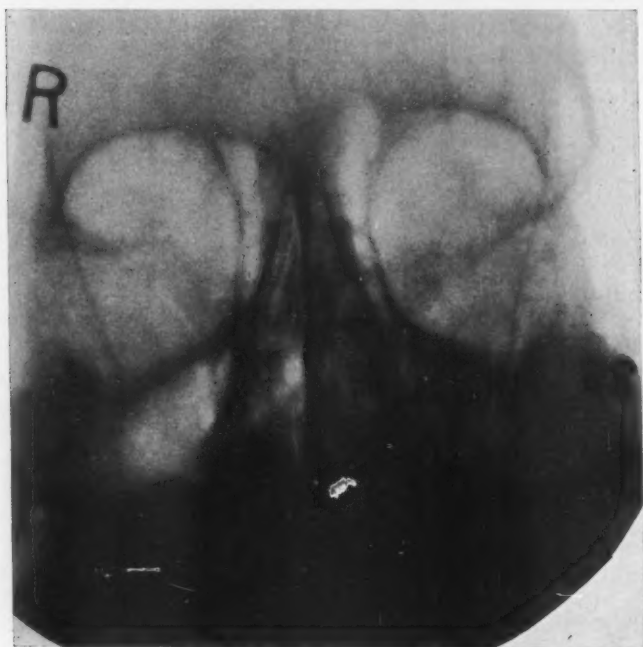


Fig. 1. An antrum before injection.

The neosilvol is first triturated in a mortar and the surgical lubricant added. This mixture has been kept for a month and no decomposition was found—it seems to keep better than aqueous suspensions of neosilvol. The usual prescription for an antral injection is 2 drachms of neosilvol and 5 drachms of surgical lubricant.

The mixture is injected into the sinus in question through any kind of needle with an ordinary 10 or 20 c.c. syringe. The patient is

instructed to say when the neosilvol reaches the throat and the mixture is tasted. The injection is stopped and patient permitted to expectorate, or even blow the nose gently. It is not necessary to have the patient hold the head in any particular position to keep the suspension from draining out of the sinus nor to plug the nares with cotton. The X-ray picture is then made.

The shadow cast is entirely adequate for diagnostic purposes. There have been no reactions from either sphenoid or antral injection.

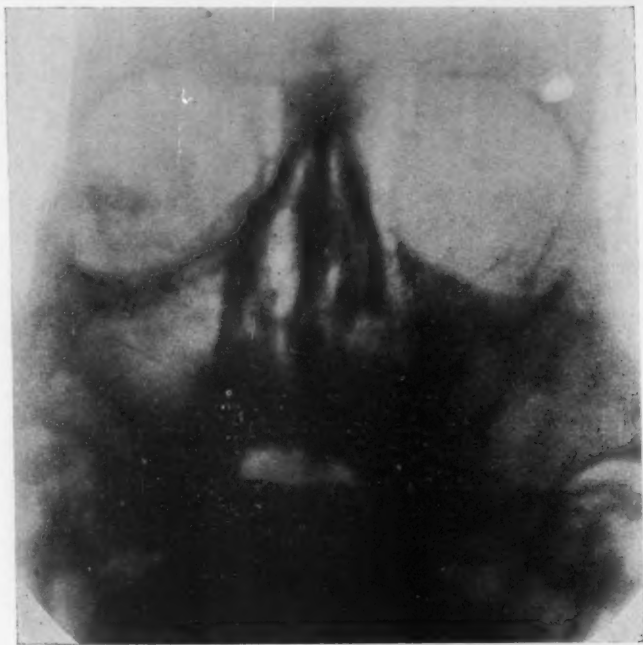


Fig. 2. An antrum after injection.

tions. The patients do not as a rule complain much of the taste or smell of the mixture. Even though neosilvol is not pleasant to taste or smell, it is much less distasteful than lipiodol.

An advantage of neosilvol over lipiodol is the fact that neosilvol is always at hand and can be found in most drug stores or doctors' offices. Neosilvol is much cheaper than lipiodol ( $12\frac{1}{2}$  cents as compared to 35 cents per drachm); also, the neosilvol has a decided therapeutic effect, as one of our cases was an old chronic suppurat-

ing antrum which was irrigated some 18 or 20 times with large quantities of pus obtained each time. It was washed every other day with about the same amount of pus coming off until the injection, when there was practically no pus for the following three weeks. Certainly, the neosilvol has a therapeutic value (germicidal). Lincoln Brown and Neuswanger have proven conclusively that lipiodol is neither bactericidal or even bacteriostatic.

The neosilvol is much nicer to work with and handle. Lipiodol leaves a permanent black stain on cloth and care must be exercised not to spill any on the patient. Neosilvol does not stain, of course.

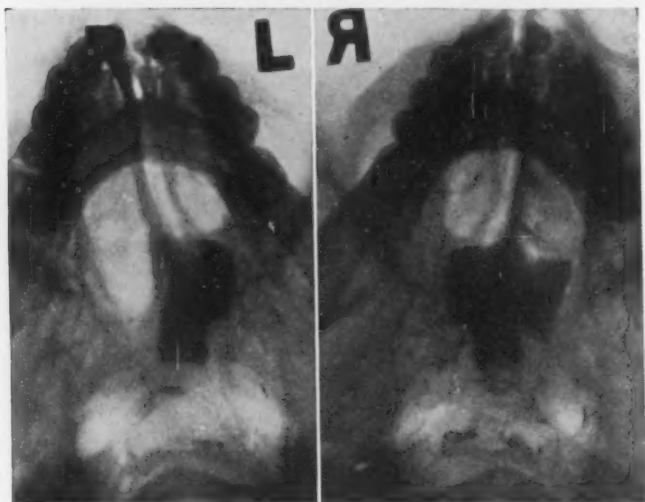


Fig. 3. Sphenoidal injections on the same patient at the same sitting: The left sphenoid injected and then the right: (Reeves position).

Naturally, the question of argyria or argyrosis arose. This we do not believe likely to occur, as the suspension does not remain in the sinuses any length of time. One case was injected Thursday and operated upon Saturday. No neosilvol was found in the antrum. X-rays have been taken five days after injection and no evidence of the opaque material seen. We have examined patients several hours after and then each day following injection. Usually for 36 to 48 hours there is some of the mixture seen in the middle meatus and then no more; so it is supposed the antrum is empty by this time, as the X-ray also shows no evidence of the material. The rate of empty-

ing is probably a measure of the amount of active cilia remaining in the sinus.

In a personal communication, P. D. and Co. says: "We have no reports of cases of argyria following the use of neosilvol. It seems very probable that the silver iodid is so slowly decomposed that it is excreted without there being at any time a sufficient accumulation of silver to cause argyrosis."

Hoseltine carefully searched the literature for cases of argyria following the use of nasal tampons of neosilvol and found none.

Van Osdel says: "I have seen no untoward effect from the use of neosilvol or lipiodol and I believe not a few patients have been saved the experience and time of undergoing a radical operation."

No reaction and no bad effects as yet have been seen from the employment of neosilvol. From 6 to 22 c.c. have been used in the antral and from 3 to 6 c.c. in the sphenoidal injections. Inject until the patient tastes it. One case will have a small cavity remaining in the sinus and so take much less to fill than another case.

The sinus may be washed first and then injected—aspirated and injected or merely injected, and if any pus is present it will usually be displaced with the injection mixture.

The pictures of antra and sphenoidal sinuses before and after injection will speak for themselves. A 40 per cent suspension of neosilvol in surgical lubricant was used.

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## International Digest of Current Otolaryngology.

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In the *Southern Medical Jour.* for December, 1930, Cullom states that in his experience about 85 per cent of mastoid cases will show an infection in some one or all of the paranasal sinuses. He further states that he "has never found a mastoid involvement in connection with a sinus infection where there was not sinus infection on the same side with the mastoid." He concludes, contrary to textbook dictum, that paranasal sinus infection is one of the chief etiological factors in middle ear suppuration.

ROSENBERGER.

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The Third Congress of the Pan-American Medical Society will be held in the City of Mexico, July 26-31, 1931. The Mexican Government is sponsoring the meeting. An interesting program has been arranged and ample time is allowed for visitors to see the local places of interest. For the convenience of those attending, special rates have been arranged by both railroads and steamship lines. For further information address Dr. Conrad Berens, Treasurer, Pan-American Medical Society, 35 East 70th street, New York, N. Y.

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The Thirty-Seventh Annual Meeting of the American Laryngological, Rhinological and Otological Society will be held in St. Louis, June 3-5, 1931, with headquarters at the Coronado Hotel. The program promises to be an unusually interesting one. Thursday, June 4, has been designated as RESEARCH DAY, the morning session to include numerous demonstrations at Oscar Johnson Institute and McMillan Eye, Ear, Nose and Throat Hospital; the afternoon session will be held at Central Institute for the Deaf, where many new and unusual features will be presented. For further particulars address Dr. Robert L. Loughran, 33 East 63rd street, New York, N. Y.



Aurel Rethi, of Budapest, in the *Zeit. fur H., N. u. O.*, Bd. 26, Part 2, page 175, suggests that when a case of vasomotor rhinitis of definite allergic cause, such as food, feathers, horsehair, etc., cannot be determined, a nonspecific desensitizer should be tried. He claims that the skin may give negative tests to some proteins because it is less sensitive than the nasal mucous membrane. Among other agents he has used a Cutivaccine Paul.

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Wittmaack, of Hamburg, in the *Internat. Zentrallblat for Ohrenheilk. u. Laryn.*, June, 1930, reports the histological study of a case of Meniere's disease. Prof. Wittmaack was willed the temporal bones of a colleague who, during life, had suffered from acute paroxysmal aural vertigo, with dizziness and marked impairment of hearing on the right side and nystagmus towards the same side. Microscopic examination showed the presence of concretions in the aqueductus cochleae and a narrow fibroma in the scala tympani. The author states that the latter may account for the deafness, while the former may be responsible for the vertigo by producing sudden and temporary blocking of aqueduct. Wittmaack states that he has seen only one other specimen of concretions in the ductus cochleae, and of this, the clinical history was unknown. He is, therefore, unable to state very definitely whether the pathological findings were the cause of the symptoms, or whether they were merely coincidental.

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James Adam presented a paper before the Scottish Society of Otolaryngology, May 31, 1930, on the Treatment of Chronic Deafness by Baths. He pleads for the trial of this method in suitable cases. He cites a case of progressive deafness with normal drums which had been treated for a year, with bougie and inflation. There had been no improvement, but he ordered hot baths with one pound of commercial epsom salts to the bath, 15 minutes' immersion, every second night at bedtime for a week; then one bath the next week and one bath every other week. His cases showed remarkable improvement after a month of this treatment. The baths make the patient sweat profusely, and several patients were able to improve their hearing themselves by means of self-inflation (*Val-salva*). With the production of profuse sweating there is no improvement in the hearing or tinnitus. He cites cases of acquired and congenital syphilis which showed improvement; there was no improvement in otosclerosis or Menierism. Inasmuch as the treatment is a simple one and can be easily applied, Dr. Adam suggests that stubborn cases be given a trial.

## THE NEW YORK ACADEMY OF MEDICINE.

SECTION OF LARYNGOLOGY AND RHINOLOGY.

*Meeting of Nov. 21, 1930.*

### **Vitamins and Deficiency Diet in Their Relation to Sinusitis. Dr. Thomas Harris.**

The paper is an abstract of the recent literature on this subject, especially of a symposium presented at the 1929 meeting of the American Laryngological Association, consisting of a paper by Prof. R. Adams Dutcher on "Vitamins in Human and Animal Nutrition," one by Roy A. Barlow on "Diet in Connection with Diseases of the Lymphatic System, Especially of the Upper Air Tract," in which he arrived at the conclusion that no such connection exists; one by Burt R. Shurly on "Deficiency Diet in Relation to the Skeleton, Especially in Connection with the Bone Affections of the Head," with the conclusion that the structure, stability and growth of the bones of the head are dependent upon the supply of Vitamins A, C and D, particularly with a determined ratio of calcium and phosphorus. The final paper was one by L. W. Dean on "The Relation of Diet to Diseases of the Sinuses." Dean, out of his many years of study, has reached the conclusion that diet alone is inadequate and that in all cases of chronic sinusitis proper drainage is essential for a cure, although in cases of acute sinusitis a diet rich in Vitamin A can be favorably impressed if administered with orange juice and a large amount of Vitamin B. While proper treatment is necessary, Dean strongly emphasizes the value of proper diet in sinus diseases, especially in children, in connection with suitable local measures and proper hygienic conditions. Particular attention was directed in the paper to the work of J. A. Stucky, who for many years has stressed the importance of proper diet in diseases of the nose and ear, and reference was made to his latest paper on the subject, which appeared in 1924, in which he set forth the remarkable improvement in the conditions of the nose, throat and ear of the mountain children of Kentucky since he instituted proper diet among them, fifteen years ago.

### **Diet in Sinusitis in Children. Dr. Adolph G. De Sanctis.**

Sinusitis in children has become a problem of paramount importance because of its increasing prevalence, the difficulties encountered in diagnosis and especially because of its resistance to treatment. For the past decade many investigators have attempted to establish a definite relationship between dietary disturbances and sinus disease. At various times various workers have ascribed the etiology to deficiencies of the various vitamins, A, B, C and D, and to deficiencies of the food elements themselves.

Rats fed on Vitamin A free diet soon develop a marked conjunctivitis, watery secretions from the nose and often corneal ulcers. The bronchial lymphatics on autopsy, however, show very little demonstrable change in these animals. This latter fact does not support the popular and generally accepted theory that a diet free of Vitamin A is directly and intimately related to infection of the upper respiratory passages.

Animals fed on diets deficient in the antineuritic factor, Vitamin B, and antiscorbutic factor, Vitamin C, show no changes whatsoever in the lymphatics of the upper air passages. Vitamins B and C are essential to normal growth and appetite and therefore necessary in the diet of the growing child. They, however, have no direct relationship to infection of the upper air passages except insofar as all children with lowered resistance as a result of avitaminosis are more susceptible to disease. A Vitamin D free diet produces in rats the characteristic rachitic changes, but again no change in the lymphatics. It is commonly known that rachitic infants and children are more prone to upper respiratory disease than the normal nonrachitic. But as with Vitamins B and C, the relationship to sinus disease is only an indirect one, again that of lowered body resistance. The same is true of Vitamins E and G, the antisterility

and pellagra preventing factors, respectively. It might therefore be properly said that a diet deficient in any vitamin, except Vitamin A, has little or no effect upon the lymphatic system. Of the vitamins studied, however, there can be little doubt that Vitamin A deficiency probably renders the lymph glands susceptible to infection and bacterial invasion.

Of the food elements themselves, besides vitamins, the one that seems to be more or less related to respiratory infection in general, is fat. The consensus of opinion is that sugar and protein do not seem to alter the lymphatics and therefore play little, if any, part in the cause of respiratory infections. Although in regard to protein this may be true of adults, I feel that growing children will do much better on high protein diet in the treatment of sinus disease. Children naturally require more protein to allow for growth, as well as to repair body waste. Although it is time-honored therapy to force fluids in the treatment of acute respiratory conditions, I do not believe that restriction of fluids in the diet *per se* plays an important part in the etiology.

After this brief discussion of diet in general we must note that whatever the relationship is between dietary disturbance on one hand and sinus disease on the other, it surely must be only an indirect one, probably one of lowered resistance of the upper air passages to infection. For if it were not so, a proper diet treatment, rich in all vitamins, would be either a specific or at least more successful than it really is. The diet which we recommend should contain liberal amounts of butter, vegetables, fruits, milk, eggs and cereal food. So far as possible, all fat should be supplied in the form of butter or cream; vegetables should be given at least twice a day, and fruits, especially oranges, should be used freely, since these furnish the antineuritic vitamins necessary for appetite stimulation. The amount of carbohydrate foods should be limited, for there is a tendency to use too much bread, potatoes and cereals in the diet of most children. To be certain that there is a liberal amount of Vitamin A and Vitamin D being supplied, cod liver oil as such or one of its concentrates is also given.

The results with this diet in some instances was striking, particularly from the standpoint of weight and general condition. This effect was more noticeable in private patients than in dispensary patients. It is by no means to be assumed that the gain in weight is to be attributed to diet alone as laryngological procedures were carried out in the course of the disease, which I feel are equally important, or even more essential, in the treatment of sinusitis than diet. It is not uncommon to see children with sinus disease, who, although they are receiving proper diet with the necessary vitamins, are not improving in general condition. Very often after proper treatment is instituted by the laryngologist, the improvement is striking and immediate. On the other hand, the reverse condition may be true; the patient then will not make satisfactory progress until the diet is corrected and proper hygienic measures advised.

After all, in the treatment of sinus infection, proper diet, though it plays an important part, cannot take the place of the proper local treatment. It is only through the proper co-operation of the laryngologist and the pediatrician that the best results may be obtained.

#### DISCUSSION.

DR. LEWIS COFFIN, discussing Dr. Harris' paper, said we must accept what has been said by the scientists as to the various vitamins because of their universal agreement. That fewer operations may be reported, but that is due to the fact that most operations are to a great extent standardized, rather than because fewer are done. He doubted if scientific medicine had as yet done anything to lessen the conditions demanding operations in our line of work or the number of operations done. He called attention to the fact that the taking of vitamins could not be overdone if taken with the foods in which they naturally occur, but said there seemed to be some danger in the use of vitamins derived artificially, as is Vitamin D from ergosterol; said deaths had occurred from its use from the distribution of calcium in other tissues than the bones, and that it seemed to cause arteriosclerosis.

Dr. Coffin called attention to the fashion among young women of so dieting as to leave out of their food all fattening elements and said that such practice must of necessity restrict the Vitamins A and D contents of their blood and

thus deprive their offspring of these elements, both during gestation and after birth. He expressed admiration for the manner in which the pediatricians had met this problem, and were today so artificially feeding children that many feel that they are more healthy and robust than ever. He stated that undoubtedly there was a marked relation between the diseases of the upper respiratory organs and disorders of the gastrointestinal tract, and this had led many laryngologists to make careful study of dietetics. He ended his discussion by quoting Dr. Dutcher, who read the first paper in the symposium to which Dr. Harris had called attention: "Do not worry about the development of deficiency diseases. Feed sufficiently varied diets to prevent lowered resistance and susceptibility to other diseases, and that it is generally profitable and possible to obtain our vitamin supply from the dairy, the orchard, the garden and the poultry yard."

DR. THOMAS J. HARRIS, closing the discussion: All I wish to do is to correct Dr. Coffin's misunderstanding. I did not say that improper diet favors or produces infection. It is as he stated himself: it lowers resistance and lessens immunity. I do want to say it is a big subject which we have discussed tonight, perhaps imperfectly, and it is a great satisfaction to have a pediatrician like Dr. De Sanctis come forward and confirm almost identically the findings and experiments carried out in the West by Dr. Dean, and in Kentucky by Dr. Stucky, and by Dr. Shurly. I want to thank the officers of the Section again for bringing forward this very important subject.

DR. ADOLPH G. DESANTIS: In regard to vitamin-hunger, it is not unusual to see children who really like cod liver oil. By far the vast majority of children dislike it. For that reason I prefer to use other forms of Vitamins A and D, that they do like.

This is apart from the topic of vitamins, but I have a rather pertinent question to ask the laryngologists, and that is, has bacteriophage been used in the treatment of sinusitis? It seems to me that is an important thing, and deserves careful study—the use of bacteriophage in chronic sinusitis in children may prove to be of value.

DR. JOHN M. LORE: I told Dr. De Sanctis that we are considering the advisability of getting up a meeting devoted to the use of vaccines and bacteriophage. It is only a question of making the proper connections and getting a man whose opinion we can depend on. The officers are considering that, and perhaps we may arrange a meeting later on.

DR. ARTHUR S. WILSON: That last question of Dr. De Sanctis' concerning bacteriophage is of much interest. I have used bacteriophage for the past four or five months in sinusitis. I have not had the opportunity to use it in children as yet. I have only used it in acute sinusitis and acute infections in the throat, and it is entirely too soon to report on it, but Dr. MacKenty has used it on quite a number of patients. It appears to have advantages in some cases, but we are hampered by the fact that the bacteriology in acute infections of the nose and throat is usually polyvalent, and bacteriophage is not polyvalent as yet.

DR. DUNCAN MACPHERSON: In reply to Dr. De Sanctis' question, I have used bacteriophage in a few cases. In two or three cases no phage was produced. In one case when used directly into the antrum I believe a good result followed. In others the administration was unsatisfactory. I am still trying it.

#### The Pitfalls of Local Tonsillectomy. Dr. Harry Nelvert.

*(Appears in full in this issue of THE LARYNGOSCOPE.)*

#### DISCUSSION.

DR. ARTHUR J. HERZIG: In local anesthesia in tonsillectomy I use a 1 per cent solution of urea and quinin Hcl, in conjunction with my novocain. The former acts as a hemostatic and also prolongs the anesthesia of the tonsil cavities, so that the throat is immune to pain for several days. The use of quinin and urea Hcl was reported by me in 1914, before the Section of Laryngology, New York Academy of Medicine. Secondary hemorrhage never occurs after the use of this drug.

DR. MERVIN C. MYERSON: This paper, for its size, is unusually comprehensive and admirable in its scope, but there are certain phases of the subject with which I, for one, cannot agree. For instance, the injection of the anes-

thetic solution through the anterior pillar and through the muscle to reach the capsule, I do not believe is acceptable to most laryngologists. I believe the injection of the capsule had preferably be made between the anterior pillar and the tonsil so that one is not traversing tissue unnecessarily.

Dr. Neivert's statement that sharp dissection is the dissection of choice may or may not be based upon a comparative study of the blunt dissection with that of the sharp dissection technique. Personally, I have had considerable experience with the blunt dissection technique and I am an ardent supporter and advocate of it.

Dr. Neivert also mentioned that it would be better to dissect the posterior pillar last, so that if the patient bled he would bleed in the space between the teeth and the tongue, and not down his throat. I must say that if there is any amount of bleeding from the supratonsillar space, as there most frequently is when bleeding occurs, that the blood will not find its way into the throat despite the fact that it is not coming from the region of the posterior pillar. It would be interesting to see how many patients will bleed postoperatively if you make them cough forcibly when the operation is completed, and how many patients will bleed if not made to cough in this manner. Dr. Neivert advocates having them cough, so that if there is going to be any bleeding, the vessels can be tied at once. I question the value or the rationale of that procedure. I also question the value of using silver nitrate on bleeding on the seventh or eighth day. I think we have all seen patients who bleed on the sixth or seventh, and on the eighth and ninth, or even the fifteenth and sixteenth days. Those patients have what is going to be a progressive thrombophlebitis, and I dare say the application of silver nitrate to such an area might activate or favor the recurrence of the hemorrhage very soon thereafter when the slough came away.

DR. ARTHUR S. WILSON: I have had the opportunity of observing Dr. Neivert do many of these tonsils, and I agree to everything he has said with a few unimportant exceptions. I think the most important part is what he says about cocaine. I never use cocaine in a tonsil operation. In my early days I had the very unfortunate experience of being handed the wrong solution by a nurse. Fortunately, the patient did not die, but there was a great deal of excitement for a time. I thoroughly agree with Dr. Neivert's rule of having only one solution on the table, and that is the solution you inject, and it is also in line with the report of the Committee on Local Anesthetics. Most of the accidents in work with local anesthesia have been due to mistakes made either by the doctor, nurse or some attendant in handing a wrong solution to the surgeon for the purpose of injection. I think this is extremely important, particularly in a large clinic, where there is opportunity for confusion.

DR. DAVID H. JONES: I agree with what Dr. Neivert said about the approach to the patient. This means more to the patient than we think, as the majority of the patients are frightened and anything we can do to calm them helps greatly in the operation.

In the Tonsil Service at the Manhattan Eye, Ear and Throat Hospital, morphin grs.  $\frac{1}{6}$  to  $\frac{1}{4}$ , and hyoscin was given by hypo to three patients daily, one-half hour before operation. This was done for five months, and while it allayed the fear and anxiety of the patients, there was a general complaint among the surgeons that the patients could not sit up and thus it interfered with their work. If our patients could be operated upon in a reclining position, this objection would be overcome.

As far as sharp dissection goes, I agree with Dr. Neivert as to its desirability.

The last paragraph, I thought, was the best of the whole paper, but constructive criticisms are beneficial to all. This has been proved in the reorganized Tonsil Service at the hospital, each operator being told regarding pillars torn, pieces left and hemorrhage.

DR. HARRY NEIVERT (closing the discussion): All the various statements made in my paper are the result of a rather extensive experience at the Manhattan Eye, Ear and Throat Hospital Clinic. I have watched both my results, of which I am my severest critic, and those of others, and everything I mentioned I can back up by the results we have had at the hospital, both by the methods used by others and by myself.

I want to thank the gentlemen for their kindly criticism.

**Fracture of the Nose. A Plea for Early Treatment. Dr. Francis W. White.**

*(To appear in a subsequent issue of THE LARYNGOSCOPE.)*

## DISCUSSION.

DR. JOHN M. LORE: The question of the management of nasal fractures has been commented upon rather extensively, and the attitude of the general surgeon criticized by the rhinologist. Those with any experience in the reduction of nasal fractures realize how simple a procedure it is.

DR. W. W. CARTER: The remark Dr. Loré has just made induces me to have something to say on the subject. I have been very much interested in fractures of the nose for a number of years, and have always advised the accurate adjustment of the fractured segments as early as possible. This is the more important the younger the patient, because I am quite satisfied that a great many of the deflected septa are due to early fractures of the nose, and if the nose had been properly set at the time, that not only deviations of the septa, but possibly deformities of the nose occurring later would have been avoided. A number of years ago I devised a little apparatus for holding the parts in position, known as the bridge splint. I think probably Dr. White is acquainted with that apparatus. It consists of an adjustable bridge which fits over the nose, and from this bridge is suspended the entire nasal structure by means of sutures which pass through the lateral cartilages at their junction with the ends of the nasal bones. These sutures are attached to intranasal splints, which pull the bridge of the nose up into position and hold it there for a week, and then the bones will remain in proper position. This instrument is very effective, in early fractures in adults, where there is a tendency for the nasal bones to slip out of position. I have used it effectively in many cases. I really think the most important point is in the adjustment of nasal fractures in young children. These should be properly attended to at the time, and the diagnosis of fracture should, if possible, be made at the time of the injury. This, however, is not always easily done, unless the case is seen at once, before swelling occurs, for afterward it is difficult to find out whether or not you have a fracture until the swelling subsides. Adjustment in the case of children can usually be made by means of my moulding forceps; the bridge splint is not indicated in these cases.

The point which Dr. Loré brought out in regard to the treatment of these fractures by the general surgeon I think is worthy of notice. Only last week I had a case of fracture of the nose by the windshield, due to an automobile accident. It was complicated by a cutting off of the end of the nose, so that it hung down over the lip, and the framework of the nose was fractured badly. This patient was first attended by a general surgeon, who merely sewed up the skin on the outside. The lateral cartilages were turned down into the nose, and the nasal breathing was absolutely stopped. It was three weeks after this accident that I saw the case. It was then necessary for me to undo his work in order to sew up the mucous membrane inside and raise the cartilages. I also had to close a slit-like perforation of the septum reaching from the roof to the floor of the nose. Primary rhinoplastic surgery by one accustomed to the use of the head mirror would have saved this lady much suffering, and would have rendered unnecessary the work I had to do three weeks after the injury.

DR. FRANCIS W. WHITE (closing the discussion): I did not mention the general surgeon by name, so to speak, but I did make the statement that those expert in the use of the head mirror were probably in a better position to handle such cases, and had the gentleman been capable of using a head mirror, he would not have sewed up as he did, in the case to which Dr. Carter refers.

I know Dr. Carter's splint very well, and I have used it many times. The main disadvantage is its use in young subjects. It is rather hard to keep it on them, but when you put a sealed dressing over the parts, they are not so likely to misplace the fragments.

In connection with contusions or cuts requiring dressings, I will pass around a few samples of surgical dressings which have been highly satisfactory in my hands.

First a piece of surgical lint is cut to cover accurately the area requiring dressing. Then a piece of cellophane (covering used for cigars, cake or candy boxes) is shaped to the lint, but considerably larger, at least a quarter-of-an-



inch in all directions. In the center of one side of this is placed a drop of collodion and the lint placed accurately upon it, and shortly the collodion dries and firmly holds the lint in place. Any kind of medicament desired may be placed on the free surface of the lint and then placed over the area under treatment. To hold the dressing in place a few drops of collodion are placed at the edge of the cellophane and the skin. These dressings will remain in place for several days, if necessary. They are clean, light, not unsightly, and one great advantage is that the skin surface at the edge of the lint may be inspected without removing the dressing. Up until now the samples of cellophane have been practically noninflammable, but this evening I found one that burned rather luminously. It would be well to test each one before using. Another advantage is that the transparent material may be sterilized by boiling (unnecessary) or by means of alcohol or bichlorid solution.

**Management of Chronic Tube Cases.** Dr. Arthur S. Wilson.

These cases have been collected from various city hospitals for contagious diseases, and had been carrying tubes for periods varying from one to 14 years, and they constituted a discouraging medical and social problem. The lives of many of them were in constant danger, because they coughed up their tubes, and required immediate reintubation.

Indications: Repeated coughing up of the intubation tube or inability of the patient to go without the tube after two or three weeks.

Method: It was decided to perform tracheotomies on intubated cases that could not be extubated in three weeks. This time limit was partly arbitrary and partly based on the fact that some children who could not go without their tubes around the tenth day could be permanently extubated some time during the following ten days. This time limit is not rigid; some cases were tracheotomized earlier, and some considerably later, depending upon the indications. Following the tracheotomy, partial or complete plugging of the tracheal cannula was begun at the earliest possible moment for the purpose of keeping the larynx open.

If this is not successful, dilatation of the larynx is commenced as soon as the inflammatory condition of the larynx subsides. By a combination of dilatation of the larynx with plugging of the tracheotomy tube a point is reached in favorable cases where the child goes day and night with the tracheotomy tube completely plugged; they should be completely plugged for four to eight weeks before decannulation.

Results: Cases, 14; cured, 4; died, 3; ready for decannulation, 3. The average time for cure was eight months, varying from one month to two years.

Summary: 1. At this present date there are no chronic tube cases at the Willard Parker Hospital.

2. Patients that could not tolerate extubation have been tracheotomized and treated by plugging the tracheotomy tube and dilating the larynx.

3. Four cases have been cured; three are ready for decannulation, and all the other cases are apparently progressing towards a favorable ending.

4. The children are living at home instead of in an institution; they are free from the menace of coughing up their tubes (intubation); their general health is good, and their larynges and voices are developing normally.

DISCUSSION.

DR. JOHN M. LORE: Only those who have seen these chronic tube cases can appreciate what the problem is. I feel it is a very timely subject, and we are fortunate in having Dr. Orton, of Newark, come to discuss this paper.

DR. HENRY BOYLAN ORTON: I wish to congratulate Dr. Wilson on his splendid results. In 1926 I reported 25 cases before the Eastern Section of the American Laryngological, Rhinological and Otolological Society and my conclusions at that time were, because of the long time necessary for the treatment of these chronic tube cases, Should we not urge early tracheotomy in diphtheria rather than await the uncertain procedures of continued intubation? The constant wearing of intubation tubes causes changes within the larynx. Before any attempt to decannulate these patients, infected tonsils were removed. Dr. Wilson did not mention this fact, and I should like to ask whether he has the tonsils of these patients removed before decannulation.



The influence of disease on laryngeal cases is important, and the diseased tonsils, as well as any nasal infection, should be eliminated before any work is attempted.

This evening I called up the Isolation Hospital in Newark, and since 1926, when I reported these 25 cases, they have had 13 additional, which brings the total to 38. The number of intubated cases since 1926 has been 383, with 134 positive cultures. There have been 23 tracheotomized patients, and in these 23, 13 were chronic tube cases. Three of these 13 tracheotomized patients died, two I believe unnecessarily because of the fact that the postoperative care of tracheotomized patients is in the nursing, and you cannot expect to pull these patients through if you simply tracheotomize them and turn them back into the ward for treatment. They should have two special nurses with them constantly day and night. They do develop a severe trachitis, and unless the tubes are kept clean, they will certainly plug up, and the patient will go out of the picture very shortly.

Dr. Wilson speaks of after three weeks of intubation, they should be tracheotomized. If it is necessary to intubate a patient six or seven times over an interval of three to four days, it is best then to tracheotomize the patient and stop traumatizing the larynx, because in these little children, they go bad very quickly, and with every intubation we are causing additional trauma, and we must admit that diphtheria is a necrotic disease. There is ulceration in the larynx, and every time you attempt to intubate you are causing additional trauma.

As regards the noncough up tube, I quite agree with Dr. Wilson; I do not think it should be used at all. It makes pressure at the lower third, just where you have trouble, namely, in the subglottic area, and if that area is continually irritated and traumatized, especially in young children, it will be necessary to tracheotomize the patient.

Dr. Wilson is to be congratulated on his 14 cases where tracheotomy was the only necessary procedure, plus dilatation. He did not mention whether any of these patients had been laryngectomized. I presume not. It is a subject which is very interesting. It is very trying to work with these very young children, as it takes anywhere from a year to two-and-a-half years for treatment, and Dr. Wilson is to be congratulated on his results.

Dr. LEON T. LEWALD: There is one complication which Dr. Wilson did not emphasize which I had the opportunity to see at the Willard Parker Hospital, where I have charge of the X-ray work. The late Dr. Lynah went over a great many of these cases, and bronchiectasis was a complication present in several of them, and not only the ordinary lower lobe bronchiectasis, but in two cases there was an *upper lobe* bronchiectasis. I have never seen an upper lobe bronchiectasis except at Willard Parker Hospital, and I think it is one more reason of avoiding these prolonged intubations, for fear of having bronchiectasis develop.

Dr. ARTHUR S. WILSON (closing the discussion): I want to thank Dr. Orton for his very kindly remarks.

I have not seen any of the cases which Dr. LeWald speaks of, because that type of case had left the Willard Parker before I was on service. Our idea was to try and prevent the chronic tube cases. When we began to work, I tracheotomized the first case after six weeks. Dr. Hackett wanted to do it in ten days. I thought that was a little bit drastic, inasmuch as I always had the feeling that tracheotomy in very young children was an exceedingly dangerous procedure. I have done tracheotomies in three cases in very young children, under 1 year of age, and they stand it just as well as the other children. There are some technical difficulties on account of the small size of the parts. The first cases we did under general anesthesia, but the later ones have been done under local. We have tried to prevent the chronic tube cases. We now do tracheotomies much earlier; most of them are being done within the first two weeks.

## THE NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

*Meeting of Jan. 19, 1931.*

Dr. Hilliard Wood, Chairman, Presiding. Dr. H. C. Smith, Secy.-Treas.

### **Series of Fifteen Cases of Chronic Otitis Media Treated with Iodin Dusting Powder. Dr. Guy Maness.**

Dr. Maness reported a series of 15 cases of chronic otitis media treated in the Department of Otolaryngology at Vanderbilt University with iodine dusting powder-Sulzberger, according to the method of Dr. M. B. Lederman.

The following treatment was employed: 1. Thorough removal of granulation tissue from the middle ear and secretion from the external auditory canal. 2. Removal of contributory causes. 3. No irrigation of the ears was permitted. 4. Application of a 2 per cent iodine dusting powder-Sulzberger was blown into the external auditory canal and middle ear by means of a small powder blower with a hard rubber tip, two or three times weekly, depending on the quantity of drainage.

Case 1: E. G., male, age 13 years, gave a history of foul drainage from the left ear of seven years' duration. Tonsillectomy and adenoidectomy had been performed with no relief. Irrigations, alcohol drops and other forms of treatment were of no benefit. There had been labyrinthine disturbance.

Examination: Right ear: Hearing normal. There was a small perforation of the right membrana tympani without drainage. Left ear: Hearing greatly impaired. Moderate amount of foul-smelling drainage. The external auditory canal was practically filled with granulation tissue, which was removed by cauterization with silver nitrate. The drum had been practically destroyed. The adenoid was hypertrophied.

Treatment: Two per cent iodine powder was insufflated into the left ear. The patient complained of severe pain and did not return for one month. The procedure was repeated with practically no pain. After receiving four treatments the ear was dry. Six biweekly treatments were given. Adenoidectomy was performed. There has been no return of the drainage.

Case 2: Miss A. B. B., age 19 years, following scarlet fever in childhood, the right ear had drained for several years. The drainage had been constant and profuse for four years previous to the examination.

Examination: Right ear: There was practically no air conduction for low tones and about 50 per cent for high tones, bone conduction was normal. Profuse foul drainage. A large polypus was present in the right external auditory canal. Left ear: Normal. The throat was negative.

Treatment: The polypus was removed and 2 per cent iodine powder was insufflated. The discharge ceased after three treatments. The treatment was continued at intervals of three days, and after five more treatments the patient was dismissed. At the end of four months the ear was still dry.

Case 3: Miss L. L., age 12 years; the right ear had drained all of the patient's life, but had been worse for the last year. The discharge was often tinged with blood.

Examination: Right ear: There was profuse foul drainage from the ear. The eardrum was almost completely destroyed. Left ear: Normal. There was adenoid hypertrophy. The tonsils were negative. Tonsillectomy and adenoidectomy were performed. One month later the ear was draining profusely. Two per cent iodine dusting powder was insufflated biweekly for seven applications, after which the ear was dry. The patient had not returned.

Case 4: Miss B. S., age 21 years, had had a drainage from the right ear 12 years. Irrigation and alcohol drops had not affected the condition. Recently there had been pain in the ear, accompanied by dizziness.

Examination: Right ear: Hearing impaired. Moderate aural drainage. The eardrum was absent. Left ear: Normal. Tonsillectomy and adenoidectomy had been performed.

Treatment: Radical mastoid operation was performed. One month later moderate drainage from the ear was present. Two per cent iodine powder was applied biweekly for ten applications. The ear had remained dry for five months.

Case 5: F. R., age 4 years, had had drainage from both ears for three years. Tonsillectomy and adenoidectomy had been performed.

Examination: Profuse purulent drainage from both ears. There was a large inferior perforation of right drum and large posterosuperior perforation of the left drum.

Treatment: With 0.75 per cent iodine powder at first, followed by five applications of 2 per cent at weekly intervals, stopped the drainage. The ears had remained dry for four months.

Case 6: L. P., age 1 year, drainage from the right ear for one month.

Examination: There was profuse drainage from the right ear and moderate posterior perforation of the drum was present.

Treatment: Two per cent iodine powder was applied twice weekly for eight treatments. The ear had remained dry for two months.

Case 7: Miss C. J., age 20 years, had drainage from the right ear all her life. Extreme vertigo for five months. Tonsillectomy had been performed, and one year later a simple mastoidectomy was performed. There had been no change in the drainage.

Examination: Right ear: Hearing very poor. Profuse foul drainage from the right ear. There was some granulation tissue present. The posterosuperior third of the drum was absent. Left ear was normal.

Treatment: Cauterization of granulation tissue and use of 2 per cent iodine powder weekly for one month. The ear had remained dry for one month.

Case 8: R. N. M., age 5 years, had intermittent drainage from both ears since early infancy.

Examination: Moderate purulent drainage from both ears. Large superior perforation of right drum and large inferior perforation of left drum. She had chronic tonsillitis and adenoids. Tonsillectomy and adenoidectomy was performed. Treated with 2 per cent iodine powder for four times and ears had remained dry for one month.

Case 9: M. B., age 13 years, had intermittent drainage of the right ear for two years.

Examination: Right ear: Hearing moderately reduced. Moderate foul drainage. The lower third of the drum was absent. Left ear was normal.

Treatment: Two per cent iodine powder was applied at weekly intervals for seven treatments. After the fifth treatment the ear was dry and had remained dry for four months.

Case 10: Mrs. M. B., age 28 years; there had been drainage from the right ear for one year. There had been discharge from the left ear in early life. Recently had some dizziness.

Examination: Right ear: Hearing was very poor. There was a large posterosuperior perforation of the right drum with foul drainage. Small amount of granulation tissue was present. Left drum normal.

Treatment: Two per cent iodine powder was applied weekly for four treatments, after which the ear had remained dry for two months.

Case 11: N. C., age 12 years, had profuse drainage from the left ear, one month.

Examination: Right ear normal. Left ear: Hearing moderately reduced, profuse, offensive discharge from right ear. Tonsillectomy and adenoidectomy had been performed.

Treatment: Two per cent iodine powder was applied twice weekly for six treatments. The ear had remained dry four months.

Case 12: F. C., age 10 years, had drainage from the left ear one month.

Examination: Right ear normal. Left ear: Profuse foul drainage. Large anterior perforation of the drum. Tonsillectomy and adenoidectomy had been performed.

Treatment: Two per cent iodine powder was applied twice weekly for four treatments. The ear had remained dry four months.

Case 13: E. H., age 8 years, had drainage from the right ear for two years. Tonsillectomy and adenoidectomy and bilateral antrum operation had been performed a year previously. There had been no decrease in the discharge.

Examination: Right ear: Hearing fair. The entire right drum was destroyed. There was profuse foul drainage.

Treatment: Two per cent iodine powder was applied weekly for five treatments, after which the ear was dry. Seven additional treatments were given, but due to lack of drainage the powder remained in the ear and had to be removed by alcohol irrigation. At the end of five months the ear was dry.

Case 14: D. E., age 5 years, had drainage from the left ear for 18 months. This followed a severe chemical burn about the left side of the head.

Examination: Left ear: Profuse foul drainage. The entire drum was absent. Treatment with 2 per cent iodine powder resulted in a dry ear after three treatments.

Case 15: H. L. E., age 11 years, had profuse drainage from the left ear for two years.

Examination: Left ear: Hearing fair. Entire drum absent. Profuse mucous drainage. Treatment: Simple mastoidectomy, and adenoidectomy operations were performed. There was no improvement in ear condition. Four months later radical mastoidectomy was done without benefit. Application of 2 per cent iodine powder weekly over a period of five months produced slight decrease in drainage. When last seen the ear was discharging slightly.

#### DISCUSSION.

DR. HERSCHEL EZELL asked if this treatment would do good in acute cases, and if recurrences were to be expected.

DR. F. E. HASTY said that adhesions following adenoidectomies were very common, and that patients should be examined with this in view. He believed that communication with the Eustachian tube should be destroyed with performing mastoid operations.

Several of the doctors present had used the powder and thought very well of it if the treatment as described by Dr. Lederman was carried out.

DR. GUY MANESS, in closing, said that he had never used the powder on acute cases. He realized that his patients had not been observed long enough to know what the end-result would be, but that Dr. Lederman had had cases with no recurrence after four or five years.

